INDIA

R WORLD

L & SYNTHETIC

JANUARY, 1944

Semi-
STERLING
Reenforcing
Furnace

GODFREY L. CABOT, INC., BOSTON

Newsletter No. 1
JANUARY, 1944

Published by Rubber Chemicals Division of DU PONT

TRY NEOPRENE TYPE CG FOR MANY SPECIAL PRODUCTION ITEMS

NEOPRENE TYPE CG is closely related to the familiar Neoprene Type GN (GR-M) which is being so widely used as a general purpose synthetic to meet the requirements of many difficult service conditions. Like Type GN, Neoprene Type CG is a chloroprene polymer which produces vulcanizates having excellent physical properties and inherent resistance to oils, chemicals, heat, sunlight and normal aging or oxidation.

The sticks or rods of raw Neoprene Type CG are hard and stiff having a Shore Durometer hardness of over 75 in contrast with those of Type GN which have a hardness under 40. This difference is due to the inherent tendency of unvulcanized Type CG to freeze at normal room temperatures. Inasmuch as Type CG breaks down readily during mastication, despite its apparent original toughness, and since the property of freezing at nominal room temperatures is lost to a large extent during vulcanization this type of neoprene offers advantages over other types in certain manufacturing operations.

EXAMPLES—No two plants encounter exactly the same manufacturing problems even when engaged in producing the same product. However, it is believed a few typical illustrations of problems solved by the use of Neoprene Type CG may suggest a place where it may be helpful in your production efforts.

In the manufacture of molded mechanical goods having complicated shapes, a high percentage of defective parts sometimes results. Failure of the stock to completely fill the mold cavity is a common cause. One factor contributing to this may be insufficient back pressure built up by the stock due to the thermoplasticity of the stock itself. When such an occasion arises, the use of a compound based on the harder Neoprene Type CG having a higher softening point is indicated as a possible means of solving the problem.

In a static condition, when not being masticated or worked, unvulcanized compounds of Neoprene Type CG retain a considerable degree of their original stiffness at temperatures up to 50° C. Thus, preformed but uncured products in process retain their shape and withstand mechanical abuse much better than they would if made from other elastomers. This property offers obvious advantages in the manufacture of certain types of braided hose, for example.

Further, because properly compounded Neoprene Type CG stocks will vulcanize at temperatures as low as 50° C., complicated extruded shapes may be produced with a minimum of trouble from deformation during cure in open steam or hot air.

The amazing combination of unvulcanized stiffness and low curing temperature also suggests interesting possibilities of using Neoprene Type CG compounds in the manufacture of products, a part of which is made from relatively low melting point thermoplastics or elasto-plastics.

Neoprene Type CG vulcanizates are also of interest in applications requiring excellent resistance to deterioration by heat. Certain specialty mechanical goods, cut thread and even tire stocks are suggested as applications in which Type CG vulcanizates might be of value. In the accompanying table, comparing similar vulcanizates of Neoprene Types CG and GN (GR-M), the hot tear strength on the long overcure is particularly worth noting.

MINUTES CURE @ 35 PSI STEAM	Neoprene Type CG		Neoprene Type GN	
	60	360	60	360
Modulus @ 300% Elongation, psi	1425	1850	1250	1950
Tensile Strength @ Break, psi	4350	4525	4250	3950
Elongation @ Break, %	720	590	710	500
Hardness, Shore A	72	74	74	75
Tear Resistance @ 100° C., # per in.	355	300	250	240

CEMENTS—Adhesive cements made from Neoprene Type CG have proved to be outstanding in a wide variety of services. Dry films from Type CG cements have high initial cohesive strength because of their unique property of freezing at room temperature. In addition, such cements are capable of vulcanizing at room temperature to produce non-thermoplastic bonds having the excellent physical properties and resistance to aging, oils and chemicals typical of neoprene vulcanizates.

Through the mill

DRUMS—Return neoprene latex drums promptly. We can't ship latex in paper bags and we won't have enough metal drums if latex users do not return them promptly. Furthermore, we can't buy more if a high percentage of the drums shipped are not returned to us.

RETARDER W—This scorch controller has proven to be just as effective in GR-S compositions as in rubber, especially with thiazole accelerators.

AQUAREXES—The Aquarex products are all sulfated higher alcohols and are in great demand as mold lubricants for synthetic rubber compounds as well as for dispersing and stabilizing agents for latex. The demand is so great that it is difficult to supply enough of any one type especially of Aquarex D. We wish to point out that Aquarex MDL Paste and Aquarex DN Paste are interchangeable with Aquarex D in all applications and, furthermore, they are more economical on a use and active ingredient basis.

COLORS FOR NATURAL AND SYNTHETIC RUBBER—Colors seem to be coming out of this wartime camouflage of olive drab and other dull shades and are being *required* to make new products visible and attractive. We have streamlined our dry powder colors to a select group from which any desired color can be made.

Back the Attack with War Bonds

DU PONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

INDIA RUBBER WORLD, January, 1944, Vol. 109, No. 4. Published monthly by BILL BROTHERS PUBLISHING CORP., 1309 Noble Street, Philadelphia 23, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents

TECHNOLOGY DEPT:

MEETING THE MEASURE OF YOUR PROCESSING REQUIREMENTS

WITCO BLACK #12 ... an extremely easy processing black of lower hysteresis than standard channel blacks. It is readily compounded without affecting the tensile, modulus or elongation, and is being used with highly satisfactory results in natural, synthetic and reclaim rubber processing. Witco Black No. 12 is a product of exceptionally uniform particle size, produced under rigid control at the Witco Panhandle Plant. It may be the solution to your compounding problem. Why not talk it over with one of our technical representatives?

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The wire in a tire gets the once-over

Half-view of tire as seen through fluoroscope machine. Bead is intact but there is damage to the casing which shows up clearly.

THIS is a powerful fluoroscope machine installed at National-Standard to analyze bead construction. It has paid for itself many times over, because with its help we can literally *see* some of the reasons why bead failures occur (although failure is practically unknown when National-Standard bead reinforcing material is properly used).

We don't pretend that this machine has divulged all the answers. We do know that working with tire company engineers and the fluoroscope, we have been able to give specific reports on the tensile strength and elongation of beads in their own tires and thereby recommend changes in such things as bead construction and tire storage that have materially reduced failures and saved thousands of dollars for many companies.

Other products, too, get the once-over from National-Standard's fluoroscope. Flat and V-belts, tubing and hose—wherever wire is used in rubber or where its use may make a product more efficient. Facilities such as the fluoroscope, and our entire engineering and research staff are at the disposal of rubber manufacturers in solving any current or future problems. Why not call on us if help is needed?

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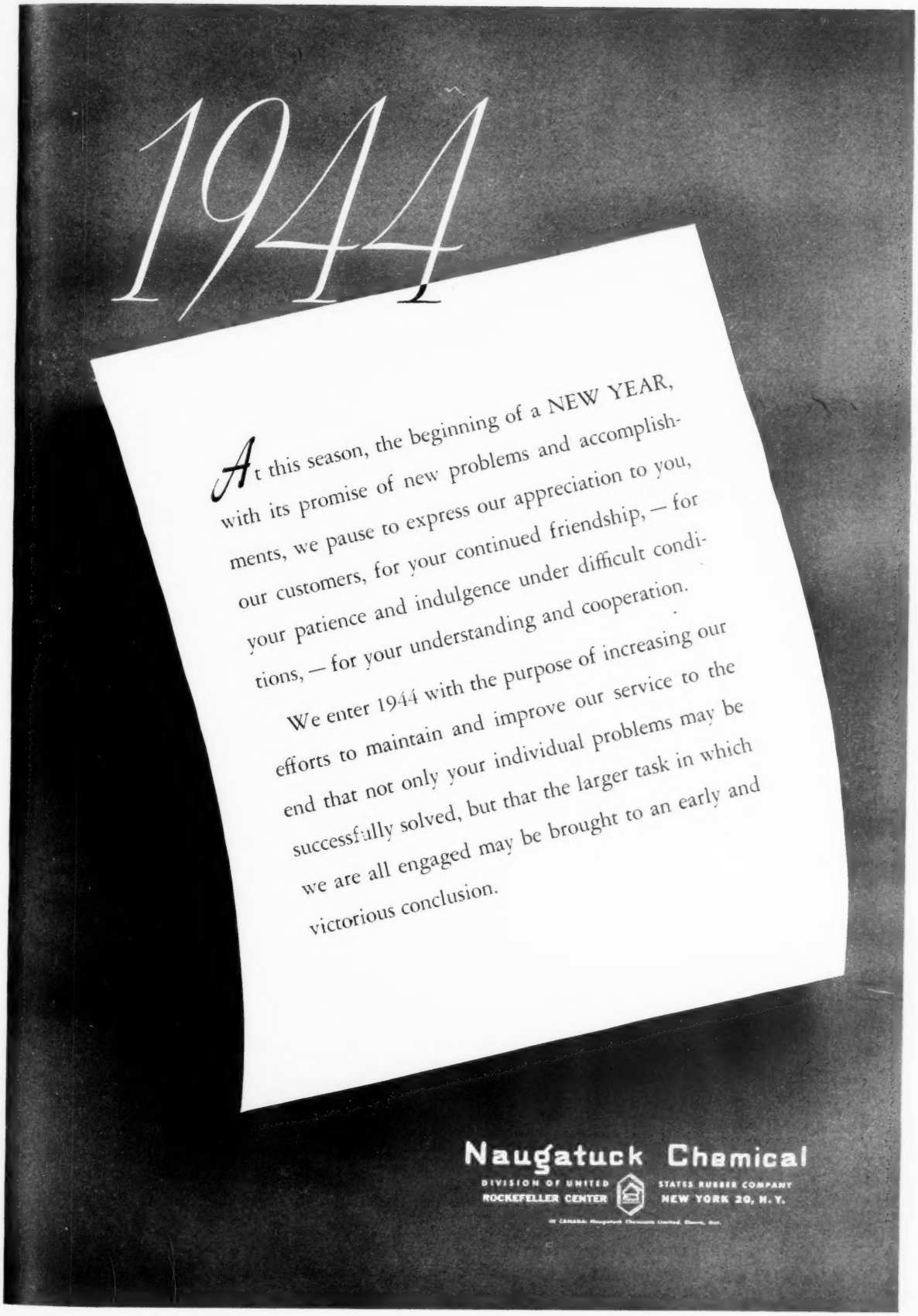
1944
At this season, the beginning of a NEW YEAR, with its promise of new problems and accomplishments, we pause to express our appreciation to you, our customers, for your continued friendship, — for your patience and indulgence under difficult conditions, — for your understanding and cooperation.
We enter 1944 with the purpose of increasing our efforts to maintain and improve our service to the end that not only your individual problems may be successfully solved, but that the larger task in which we are all engaged may be brought to an early and victorious conclusion.
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DIVISION OF UNITED STATES RUBBER COMPANY
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• The Sign of the largest and best equipped research organization devoted to the study of zinc products.

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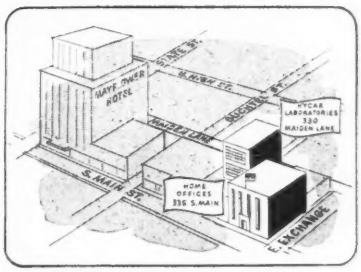
THE Hycar Customer Service Laboratory—typified by these trained men and women and its modern equipment—is available to you without cost. *Service* has always been its purpose and even in war times that service improves. Working with almost every rubber company and, through them, with concerns in the aviation, oil, chemical and many other industries, Hycar is daily developing new compounds and methods that can save you time, money and materials in serving your customers.

This Laboratory is yours. Here's a map to show how easily it is reached in Akron. Or—we'll bring our experience to you. We want to help. What can we do to serve you?



Hycar

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

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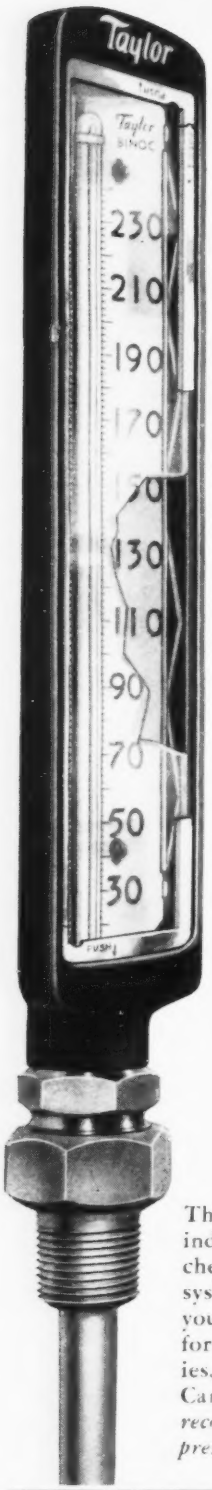
Have you seen Taylor's NEW Industrial Thermometer?



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4. **CLEAR THICK GLASS** is used on all Taylor Industrial Thermometers to give maximum legibility and maximum protection to the thermometer tube.

5. **EASY READING BINOC TUBE . . .** All Taylor Thermometers with ranges up to 750°F. are equipped with triple-lens Binoc tubing which is now better than ever. The mercury column stands out vividly through a wide angle of vision. Binoc is a patented feature, exclusive with Taylor Instruments. Easy reading Binoc invites frequent reading.

6. **BOLD, EASY READING SCALE** stands out clearly against a sharply contrasting background.

7. **MANY STANDARD RANGES** within the limits of minus 40° and plus 950°F.

8. **WIDE VARIETY** of stem constructions available.

9. **PERMANENT TAYLOR ACCURACY . . .** Glass tubes are heat treated to remove strain, which greatly reduces breakage—and artificially aged to prevent calibration change later. Tubing has sufficient test points to assure accuracy over entire range. Scale is *individually graduated* for each tube.

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ARMY NAVY

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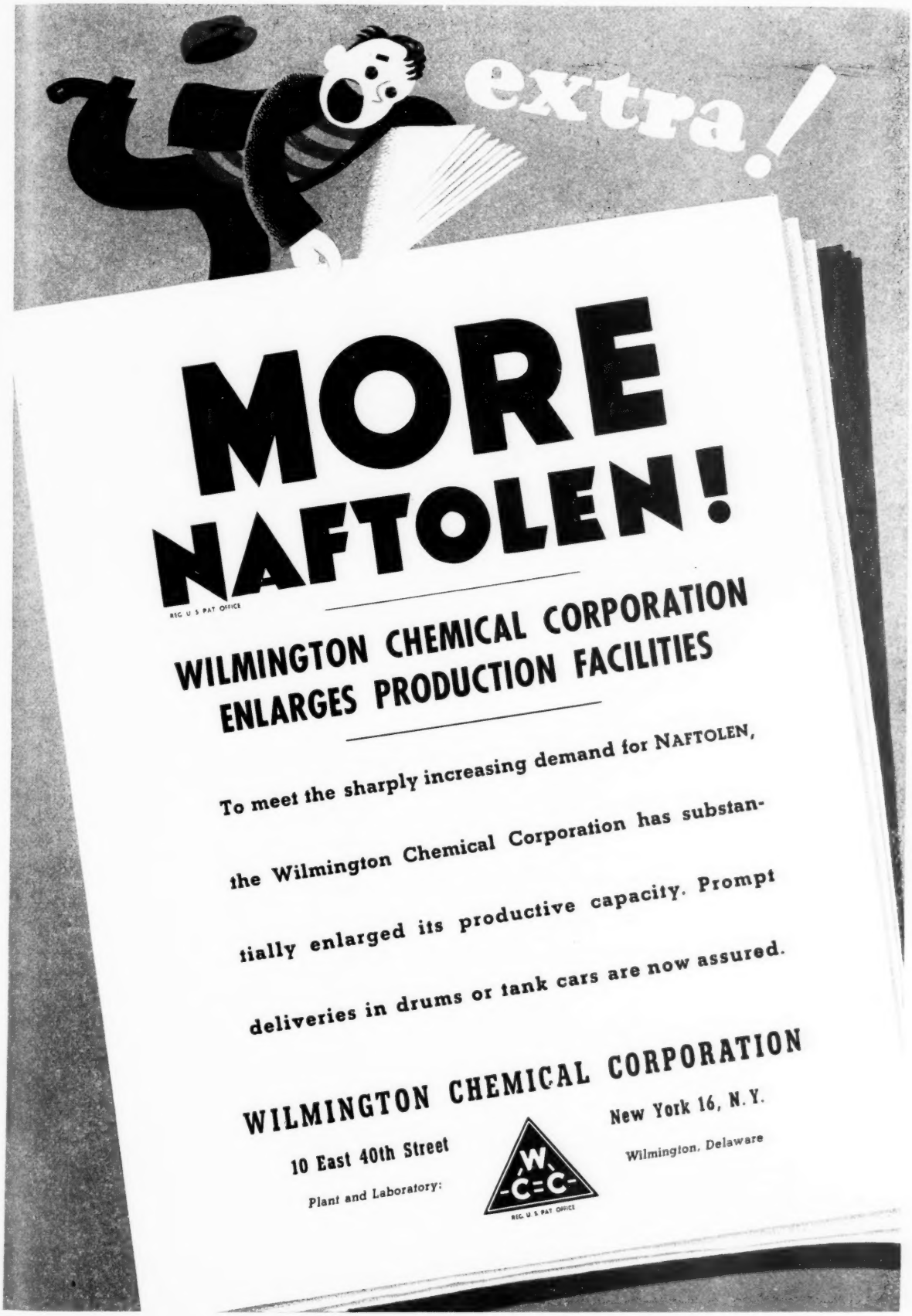
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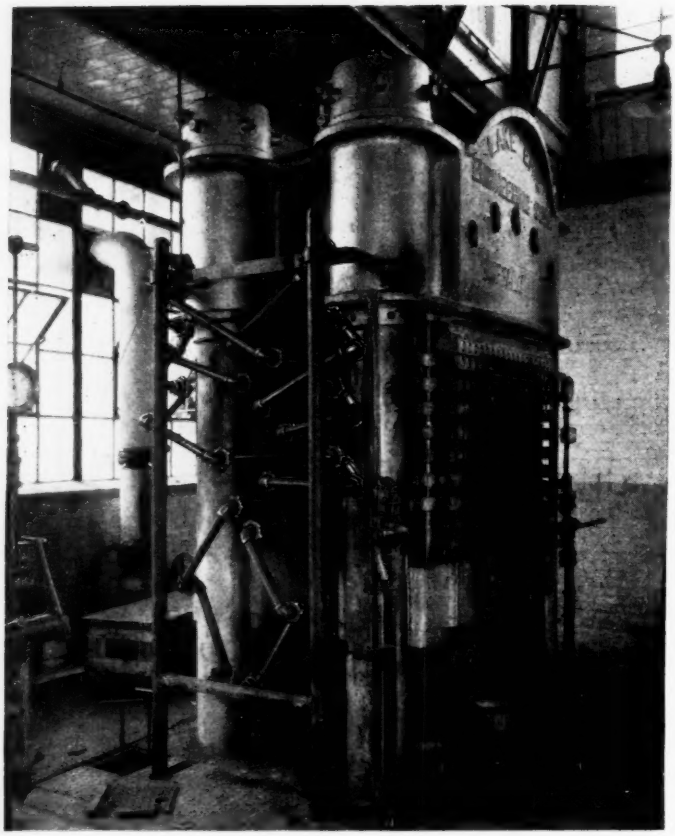

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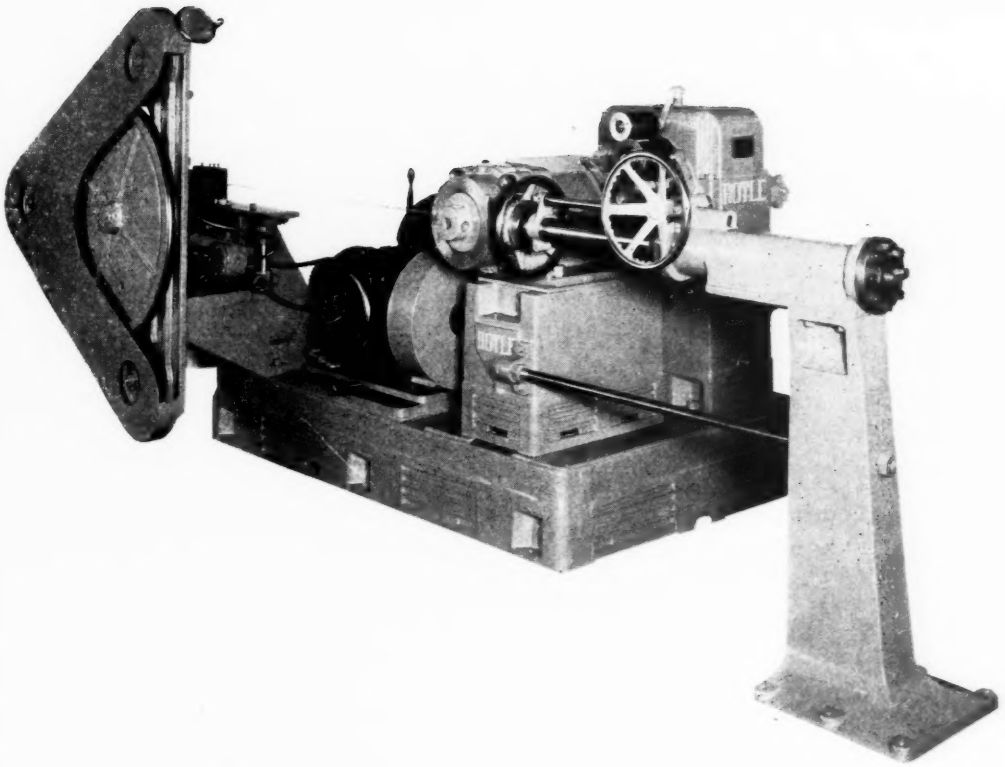

Enough Rubber For The Offensive Thanks To American Industry

When the history of this war is written it may well be that the most serious setback handed the Japanese resulted from the spontaneous and wholehearted spirit of cooperation exhibited by the Rubber, Chemical and Petroleum Industries in meeting the threat to our rubber supply. Superb teamwork soon developed synthetic sources which possessed sufficient stamina to meet the more rigorous requirements of rubber products.

Since the first tubing machine was produced 64 years ago John Royle & Sons, working in close cooperation with the Rubber Industry, have kept pace with each phase of development. Royle Extruders are built to meet the specific requirements of the application involved.

Naturally, there has been a wealth of knowledge and experience acquired. This "know how" is built into Royle equipment—reflected in performance records.

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RECLAIM is important to the easier handling of synthetic rubber. It has proved that it can save power, and speed up mixing time. In many cases, users find properties of their compounds actually improved after heat-aging when reclaimed rubber has been added.

Philadelphia Rubber Works representatives will help you in the selection of the proper grades to answer your own GR-S compounding needs. These men have many ideas, based on their experience with wartime production problems. They invite your inquiries. The Philadelphia Rubber Works Co., Akron, Ohio.

Philadelphia
RECLAIMED RUBBER

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Photo Courtesy B. F. Goodrich Co.

A large and important war use of PELLETEX and GASTEX compounds is for the linings of bullet proof fuel tanks for aircraft. Thanks to the special properties which these leading semi-reinforcing furnace blacks possess, such compounds are stronger against puncture, while their solvent resistance gives them longer service life.

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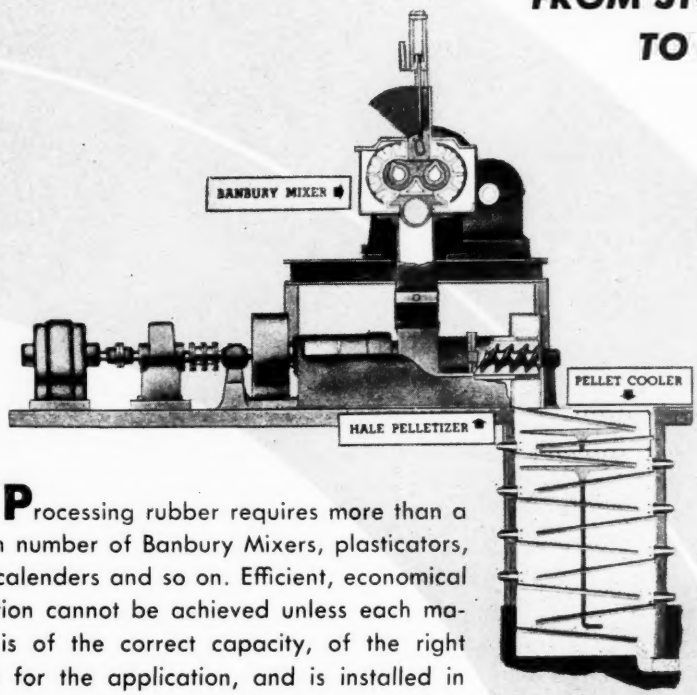
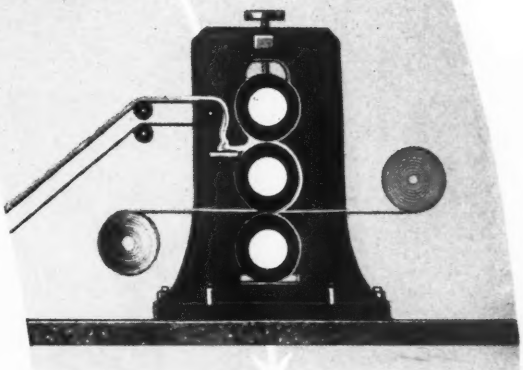
FROM STOCK PREPARATION TO FINAL PROCESSING



Processing rubber requires more than a certain number of Banbury Mixers, plasticators, mills, calenders and so on. Efficient, economical operation cannot be achieved unless each machine is of the correct capacity, of the right design for the application, and is installed in proper relation to other equipment in the plant.

This is the reason Farrel-Birmingham engineers welcome the opportunity of working with you while your plans are still in a preliminary stage. To help you select your equipment so that you will receive full benefit from each individual machine, and from your plant as a whole. In a recent case our engineers recommended a minor change in existing equipment which eliminated the need for additional Banbury Mixers. The rubber company saved thousands of dollars and, in addition, was able to increase production in less time than would otherwise have been required.

Before you order new processing equipment, tell us what your problem is, and give us an opportunity to work out a solution with you. There is no charge and no obligation when you ask our engineers for advice.



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Sole representatives in the rubber industry
STANDARD CHEMICAL COMPANY, Akron Savings & Loan Bldg., Akron, Ohio

Golly, how you've grown, Mr. Jones!

Yes, the kid grew up while he was away . . . grew up dreaming dreams of a Dad who was fighting for him . . . and a million other sons. The kid grew up . . . and so did his father. He wants and deserves a better world in which to live.

United Carbon Company, Inc. during these war years has been keeping pace with the vision of those who fight democracy's battle. Its technicians and laboratories have spent every possible man-hour developing new types of *carbon black* to extend the effectiveness of industry—and the progress which industry makes possible. *Carbon black* gives strength, durability, and color to a large variety of products . . . all types of tires and automotive equipment, electrical devices, insulated wire and cables, footwear, heels, soles, plastics, paints, printing inks and many others.

When the war is over, *carbon black* will continue to play a very important part in the development of new and better products. It is an industrial vitalizer well worth your careful attention.

UNITED CARBON COMPANY, Inc.

Charleston

WEST VIRGINIA

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SEE REVERSE FOR INFORMATION ON KOSMOS 40 • DIXIE 40

Kosmos 40

Dixie 40

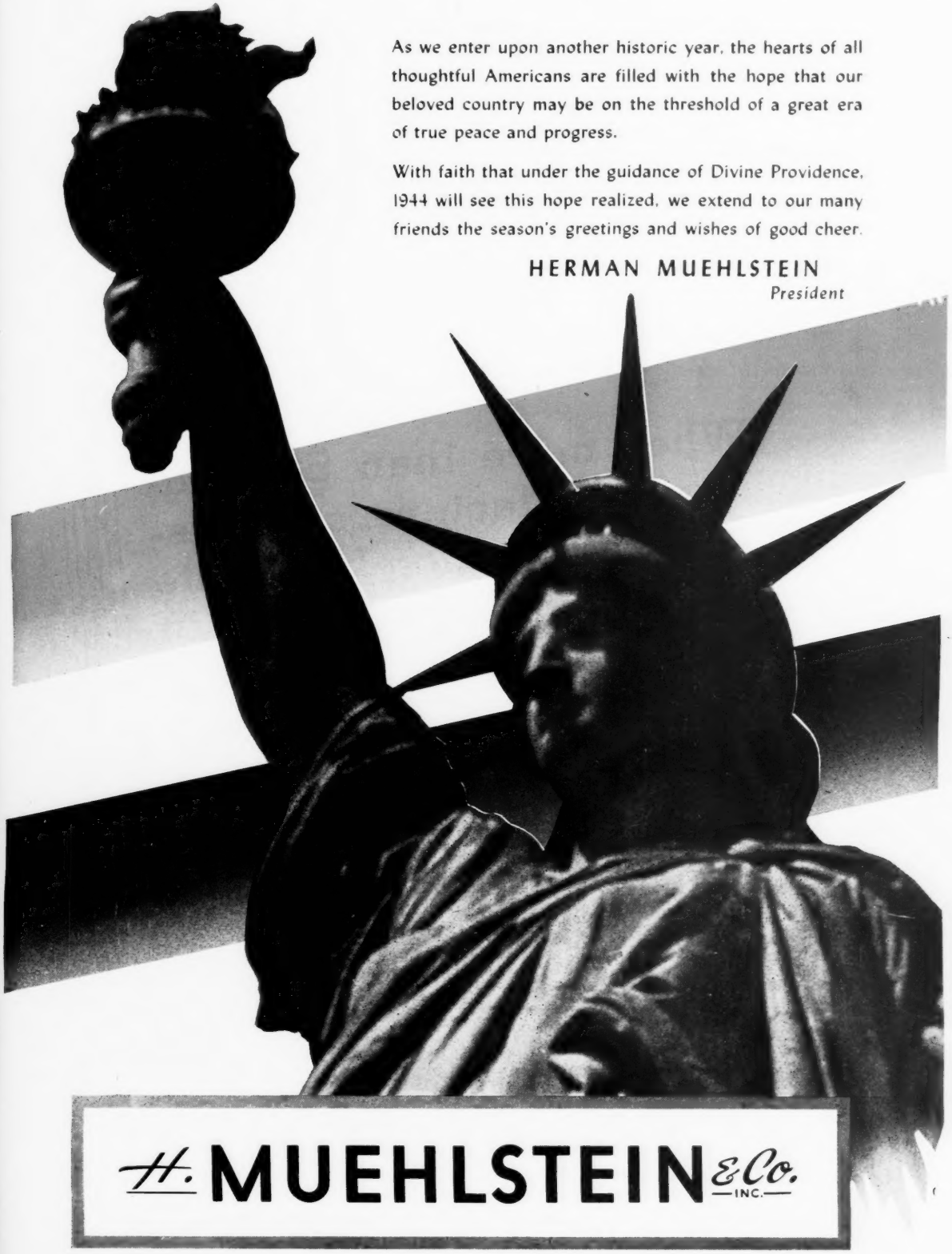
A new furnace type carbon black for synthetic and natural rubber produced from natural gas under carefully controlled conditions and possessing a combination of most desirable characteristics;—cool mixing, easy processing, smooth and rapid extrusion, fast rate of cure, full reinforcement, low heat buildup, high resiliency and high resistance to cut-growth, flex cracking and abrasion. This black is especially useful for tire treads under *any* conditions.

UNITED CARBON COMPANY, Inc.

Charleston, W. Va.

New York—Akron—Chicago

GREETINGS *for* 1944



As we enter upon another historic year, the hearts of all thoughtful Americans are filled with the hope that our beloved country may be on the threshold of a great era of true peace and progress.

With faith that under the guidance of Divine Providence, 1944 will see this hope realized, we extend to our many friends the season's greetings and wishes of good cheer.

HERMAN MUEHLSTEIN
President

H. MUEHLSTEIN & Co. INC.

There must be something to this Service...

When more than 50 leading manufacturers consistently depend on Interstate to keep their Banburys in top condition to speed wartime processing, it speaks volumes for the dependable skill our long experience provides.

We specialize exclusively in Banbury rebuilding and maintenance. Write, wire or phone us.

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EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

It has to be *Right*

Alone in his "office" in the skies, the navigator makes his observations, consults his tables, plots his position. Just a line—a simple line—marks the course. But *it has to be right* . . . the success of an important mission, the return of a bomber and its crew depend on its accuracy.

Columbia chemicals have to be right, too. Frequently they are used in operations involving the conversion of raw materials. In other cases they may enter into only one phase of a complicated manufacturing process, and pass off when their task is completed. But always they must be of a standard that assures the correct form and quality of the finished product.

This is why Columbia exercises infinite care in supplying chemicals which conform to the precise needs of its customers.

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING, PITTSBURGH (19), PENNSYLVANIA

Chicago • • • Boston • • • St. Louis • • • Pittsburgh • • • New York • • • Cincinnati
Cleveland • • • Minneapolis • • • Philadelphia • • • Charlotte

COLUMBIA SPOTLIGHT

IN COLUMBIA LABORATORIES, research continues on those two amazing pigments, SILENE EF and CALCENE. Rubber compounders will be interested in new data dealing with the evaluation of mixtures of both pigments in a GR:S composition . . . and a comparison of accelerators and accelerator-sulfur combinations in Silene EF-GR:S compositions. Both reports are compiled in a single bulletin—No. 43-5—free on request.

DEEPEST LIMESTONE MINE in the world—2323 feet—was sunk last year by Columbia less than two miles from its plant at Barberton, Ohio. Among its many unique features is semi-automatic hoisting which attains top speed of 2,000 feet per minute.

THE NATION is facing a highly critical situation in domestic freight transportation, the O. D. T. warns in a plea for the cooperation of every shipper. Be sure your shipping and receiving departments understand that the handling of railway equipment with all possible speed is vitally important to our war effort.

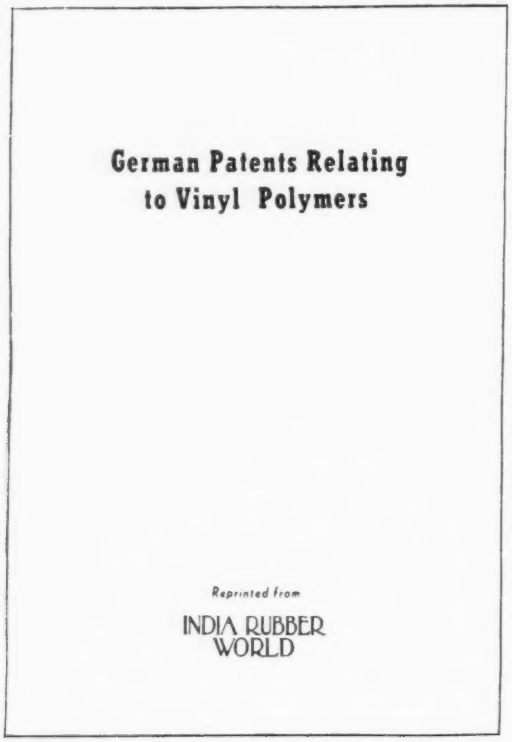
NOW IT CAN BE TOLD.. the largest Chlorine-Caustic Soda plant built as a single unit east of the Rockies—a Defense Plant Corporation project—is being operated by Columbia at Natrium, W. Va.

A REVISED EDITION of Columbia's Products Booklet is now ready for distribution. A handy reference of products, grades, package units, uses of all Columbia products. Write for free copies.

COLUMBIA CHEMICALS

Soda Ash • Caustic Soda • Liquid Chlorine • Sodium Bicarbonate • Silene EF (Hydrated Calcium Silicate) • Calcium Chloride
Soda Briquettes • Modified Sodas • Caustic Ash • Calcium Hypochlorite • Phosflake • Calcene (Precipitated Calcium Carbonate)

NOW AVAILABLE



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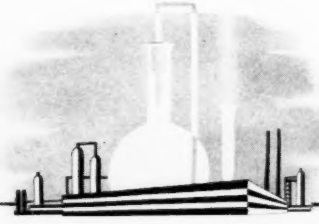

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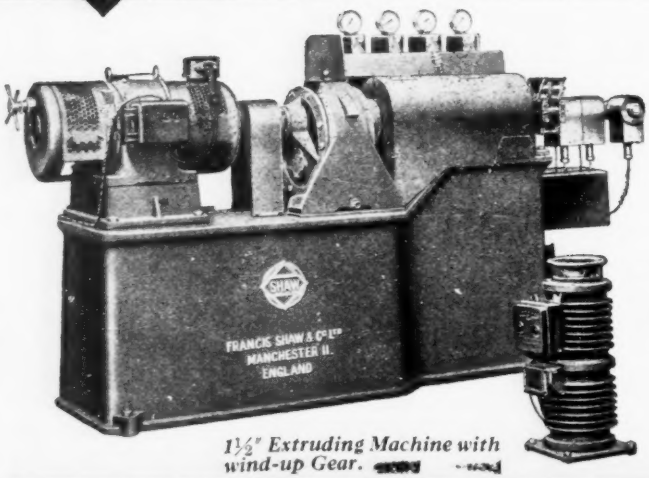

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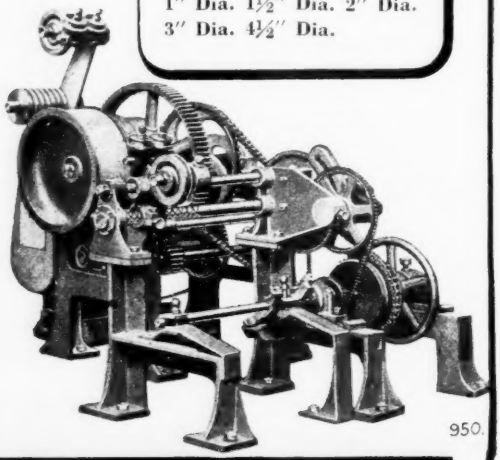

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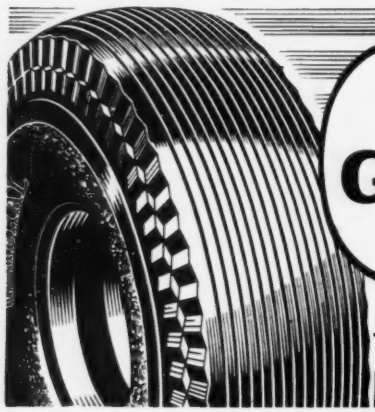

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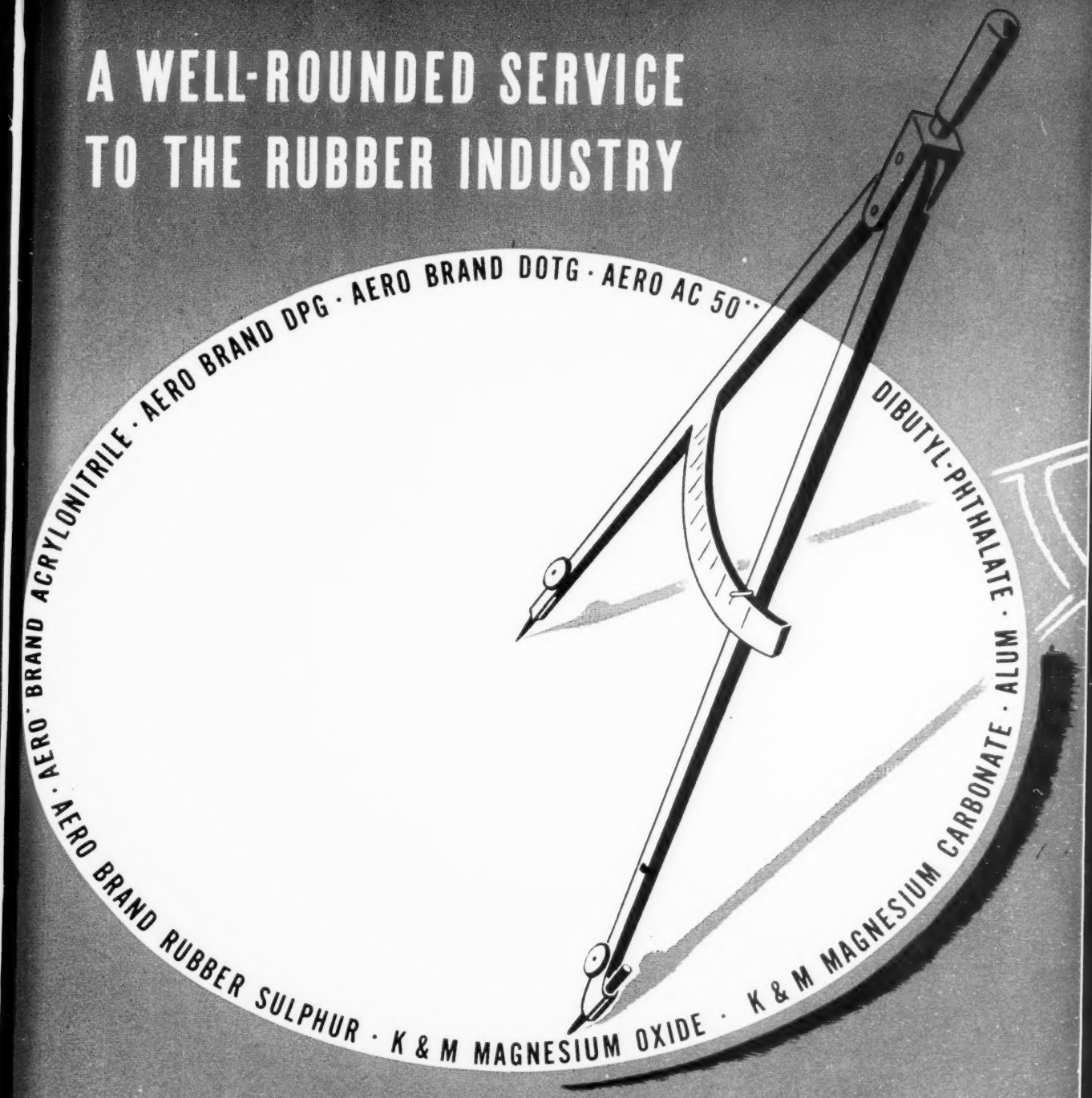
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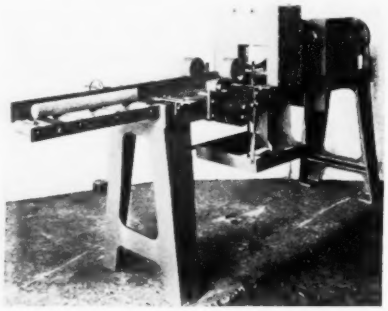

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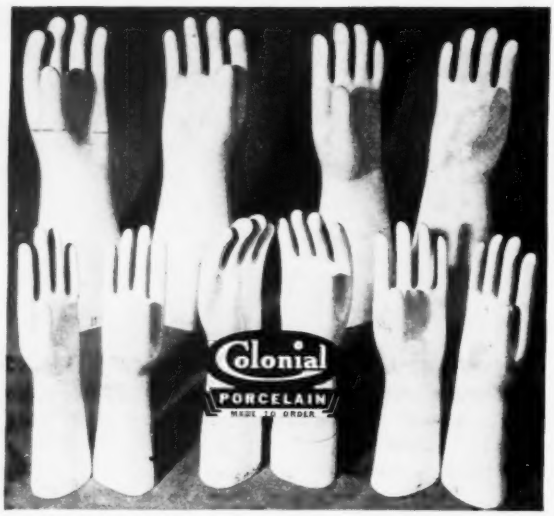

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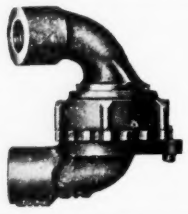

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January, 1944

VOLUME 109 NUMBER 4

A Bill Brothers Publication

INDIA RUBBER WORLD

NATURAL & SYNTHETIC

CONTENTS

DEPARTMENTS

	Pages
Editorials	380
What the Rubber Chemists Are Doing	381
Rubber Industry in United States	385
Obituary	396
Rubber Industry in Canada	398
Financial	398
Patents	400
Trade Marks	402
New Machines and Appliances	404
Rubber Industry in Europe	406
Far East	410
New Publications	415
Book Reviews	416
Rubber Bibliography	417

MARKET REVIEWS

Compounding Ingredients	418
Cotton and Fabrics	422
Crude Rubber	422
Rubber Scrap	422
Reclaimed Rubber	422

STATISTICS

Rims Approved and Branded by The Tire & Rim Association, Inc.	402
CLASSIFIED ADVERTISEMENTS	424
ADVERTISERS' INDEX	426

ARTICLES

Guayule Rubber Production by the Emergency Rubber Project — 363

Wartime Control of the Rubber Industry in Australia — HOWARD DANIEL and MINNIE BELLE — 367

Recent Russian Literature on Natural and Synthetic Rubber—VI — M. HOSEH — 368

Advances in Rubber during 1943 — J. W. LISKA — 371

Specification for GR-S — 375

Aromatic Petroleum Solvents — 379

INDIA RUBBER WORLD *assumes no responsibility for the statements and opinions advanced by contributors.*

B. BRITTAIN WILSON, General Manager

ROBERT G. SEAMAN, Technical Editor

M. J. McCARTHY, Circulation Manager

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NATURAL & SYNTHETIC

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Editorial and Business Offices, 386 Fourth Avenue, New York 16, N. Y.

Volume 109 **New York, January, 1944** **Number 4**

Guayule Rubber Production by the Emergency Rubber Project[1]

IN THE Fall of 1941, INDIA RUBBER WORLD published "The Cultivation of Guayule" by Dr. W. B. McCallum,[2] which summarized the experience of the Intercontinental Rubber Co. in domesticating guayule. Shortly thereafter these experimental operations were projected so rapidly and extensively that a sequel now becomes appropriate.

On April 16, 1941, Representative John Z. Anderson, in whose district the Intercontinental Rubber Co. had centered the experiment described by Dr. McCallum, urged on the floor of the House that the guayule industry be developed to the point where approximately 400,000 acres could be devoted to the growth of guayule.

"The existence of these conditions," he predicted, "would, in the event of a war where our overseas communications were interrupted, be of inestimable value to the nation."

On June 12, 1941, Representative Anderson introduced H. R. 5030 which provided for the planting of 45,000 acres of guayule in order to make available a domestic source of crude rubber for emergency and defense uses.

Following this country's entrance into the war, Congressional interest in Representative Anderson's proposal developed rapidly. Three days after the outbreak of hostilities the Senate Committee on Military Affairs held hearings on S. 2152, a similar bill introduced by Senator Downey.[3] This measure was amended by the committee and approved by the Senate on January 16, 1942. Extensive hearings were held that month by the House Agriculture Committee which approved the bill on January 26.[4] On February 5 the measure was passed by the House with amendments which were agreed to by the Senate on February 9.

On February 17 the President vetoed the measure on the grounds that its scope should be enlarged to include all of the Western Hemisphere.[5] This objection was met in a substitute bill, S. 2282, which was introduced in the Senate the same day the veto message was received, reported by the Senate Committee on Military Affairs the next day, and passed by the Senate on the day following. The House of Representatives concurred on February 28, and on March 5 the bill was signed by the President as Public Law No. 473 of the 77th Congress.[6]

Fig. 1. View of Adjacent Fields of Irrigated and Unirrigated Guayule, Salinas, Calif.

This basic enabling legislation has been amended only once. Public Law 751-77th Congress, approved October 20, 1942, increased the acreage limit that could be planted to guayule from 75,000 to 500,000 acres and provided other modifications to facilitate the program.

Initial Operations by Emergency Rubber Project (March, 1942—September, 1942)

The Secretary of Agriculture was authorized by the legislation previously mentioned "to provide for the planting of guayule and other rubber-bearing plants and to make available a source of crude rubber for emergency and defense uses." He designated the Forest Service as the Departmental agency responsible for administering the program and authorized the Forest Service to call upon other bureaus in the Department where necessary to insure essential technical or other services. Experienced personnel and special facilities were provided by the Bureau of Plant Industry, Soils, and Agricultural Engineering, the Bureau of Agricultural and Industrial Chemistry, and the Bureau of Entomology and Plant Quarantine. The joint

[1] This article was prepared with the cooperation and help of members of Forest Service, United States Department of Agriculture, which also loaned all the photographs illustrating the article.
[2] Oct., 1941, pp. 33-36; Nov., 1941, pp. 153-56.
[3] INDIA RUBBER WORLD, Jan., 1942, p. 393.
[4] *Ibid.*, Feb., 1942, p. 498.
[5] *Ibid.*, Mar., 1942, p. 598.
[6] An outline of the history of this legislation from December 22, 1941, to February 18, 1942, together with the President's veto message, is presented in Senate Report 1099, 77th Congress, 2d Session.

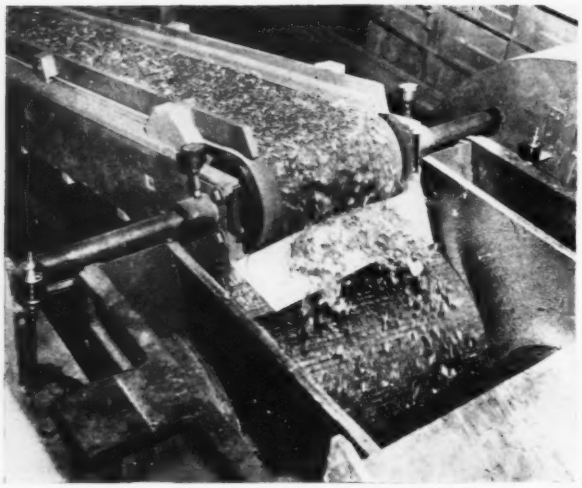

Fig. 2. Guayule Shrub Being Ground on Corrugated Rollers

enterprise became known as the Emergency Rubber Project. The same organization administers the goldenrod and *kok-saghyz* (Russian dandelion) experimental programs.

The President's veto delayed completion of Congressional action, but in the meantime preliminary steps had been taken to get the project off to a running start. On February 6, 1942, the day after the House passed S. 2152, an allocation of $884,000 was made from the President's Emergency Fund. On February 10 the Forest Service established headquarters at Salinas, Calif., under Regional Forester Evan W. Kelley, who served as director until July 1, 1943, when he returned to his regular assignment as regional forester in charge of Forest Service activities in Montana and northern Idaho, and was succeeded by Associate Director Paul H. Roberts.

By March 5, when the "guayule bill" became law, the Forest Service was prepared to operate immediately the California guayule properties of the Intercontinental Rubber Co. which were acquired under the provisions of the act[7] at a cost of $1,721,235. The purchase included 1,483 acres of land, various parts of which were occupied by growing guayule shrub, guayule nurseries, a factory, and miscellaneous administrative and laboratory structures. Other items in the purchase included rubber extraction and farm machinery, laboratory equipment, office furniture, water systems, about 550 acres of old overmature shrub, 22,867 pounds of guayule seed, nearly 19,000,000 seedlings, patents, and experimental and research data. Transplanting of seedlings obtained from the 20-acre company nursery started on that date, and by April 26 about 9,935,000 seedlings had been planted on 808 acres of plantations in the Salinas Valley and on about 70 acres of "indicator plots" distributed in California, Arizona, New Mexico and Texas.[8]

By June 5, 11,786 seedbeds representing a net area of 530 acres had been developed with overhead irrigation and sown with the 22,800 pounds of seed acquired from the company and the only seed supply in the United States.

Surveys were initiated to determine areas where soil, climate, and other essential conditions appeared suitable for shrub production and rubber formation. Promising tracts were examined and leases negotiated so that sufficient acreage would be available on which to transplant the 400 million seedlings comprising the initial crop.

About 180,000 pounds of clean seed were collected, chiefly from a 12-year-old plantation at Salinas, to assure an adequate seed supply for whatever planting program might later be adopted.

Expansion under Endorsement of Baruch Committee (October, 1942—March, 1943)

The President's Special Rubber Survey Committee headed by Mr. Baruch included in its report a recommendation that the guayule program "be given every possible support as the principal source of crude rubber which could not be lost to us short of conquest of American territory."[9]

Following the Baruch Committee's recommendation of September 10, 1942 that the authorized acreage limit of 75,000 acres "must be removed promptly if the program is to go forward on a really significant scale" and the Senate Military Affairs Committee's report of September 17, 1942, that "The Committee are impressed with the value of the proposed expansion in this program and recommend establishing a new limitation of 500,000 acres," a budget estimate of $56,000,000 was transmitted to Congress in January, 1943, as a part of the budget of the United States Government for the fiscal year starting July 1, 1943. This estimate contemplated an "all out" program which involved the leasing and planting of 176,000 acres in that period with a corresponding increase in related activities. It also envisaged maintaining 88,000 acres which were proposed for planting prior to July 1, 1943, as the initial step in carrying out the expanded program.

The unexpectedly large seed harvest had removed seed supply as a limiting factor. To utilize this seed without delay large nurseries were developed and sown in the vicinity of Indio and Oceanside in southern California and near Bakersfield in the San Joaquin Valley. Smaller nurseries in the vicinity of Phoenix, Ariz., and El Paso and Brownsville, Tex.,[10] were developed, in preparation for the proposed expansion of the planting program, but not sown.

On January 26, 1943, Rubber Director Jeffers suggested that the request for funds to continue the program after June 30, 1943, be substantially reduced to include only the maintenance of plantations established prior to that date, the collection of about 1,000,000 pounds of seed, sowing the nurseries developed in California, but continuing at an accelerated rate research into improved extraction methods. He asked that requests for funds with which to plant during the Fall and Winter of 1943-44 and to construct extraction factories for the 1944-45 harvest

[7] See INDIA RUBBER WORLD, Apr., 1942, p. 47.
[8] *Ibid.*, May, 1942, p. 150.
[9] House Document 836, 77th Congress, 2d Session, pp. 40-41.
[10] See INDIA RUBBER WORLD, Nov., 1942, p. 181.

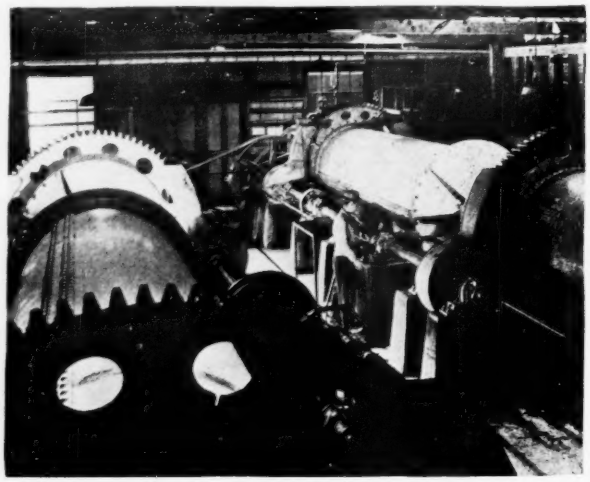

Fig. 3. Ground Guayule Shrub Is Macerated in Pebble Mills with Water to Separate Rubber Particles

Fig. 4. Rubber Particles or "Worms" Float to Surface in this Vat after Ball Milling

be withheld until the necessity of guayule rubber in 1946 became clarified. Accordingly, a revised estimate was presented to Congress which provided for $13,048,000, of which $1,041,000 was allotted to other rubber-bearing plants than guayule. This sum was appropriated by Congress.

Instead of a four-year rotation on dry land, which had originally been favored on the basis of the private experience, it was decided because of the critical outlook for natural rubber forecast by the Baruch Committee to plant a substantial acreage on irrigated land where investigations indicated that worthwhile rubber yields could be obtained after only two growing seasons. To produce significant amounts of rubber starting late in 1944 would involve the use of a substantial acreage of high-quality irrigated land. In March, 1943, Rubber Director Jeffers expressed the belief that it was not necessary or desirable to ask that the guayule program be carried on in such a way as to divert any large quantities of land and manpower from the production of essential food crops. In his Progress Report No. 3 the Rubber Director stated later on May 3:

"Conditions have changed. Food for 1943 has become more important to the nation than a rubber insurance policy for 1946 and beyond."

Curtailment under Advice of Rubber Director (April, 1943—July, 1943)

As provided in the agreement announced jointly on March 30 by the Rubber Director and Secretary of Agriculture,[11] much of the high-grade, irrigated land leased, but not already planted to guayule was turned back to the owners immediately, if they so desired, or was subleased for food production. Approximately 19,000 acres, which had been selected for guayule plantations and in many cases prepared for planting, were returned to the owners and about 1,500 acres were subleased. Planting continued on the remaining land under lease, and by the end of May a total of about 21,500 acres had been successfully planted in the coastal and interior valleys of California. About 70% of the planted acreage was on irrigated land. In the Fall of 1943 additional fields leased before March 30 and aggregating about 9,600 acres were scheduled for planting, thus bringing the total to 31,940 acres, exclusive of experimental plantings. The table given below was taken from statements of Karl Stefan, Congressman from Nebraska, before the House on December 6 in remarks having to do with the Emergency Rubber Project. He stated that the data were furnished him by the Forest Service.

Emergency Rubber Project Guayule Plantings on January 1, 1944

	Irrigated Land	Unirrigated Land Acres	Total
Spring 1943		808	808
Fiscal year 1943	15,261	6,344	21,605
Fiscal year 1944	7,175	2,452	9,627
Total	22,336	9,604	31,940

At the suggestion of the Rubber Director, the agreement announced on March 30 also provided that part of the nurseries be resown and maintained on a stand-by basis so as to have planting stock available "in the event that further survey of the rubber situation by midsummer should require a renewed emphasis on the guayule program."

No further lands were leased, but certain features of the program were continued, involving surveys of localities suited to guayule cultivation, the best methods of growing guayule under cultivation, improvement of extraction processes to obtain a higher-grade rubber product, and development of more efficient milling methods.

Preparations for Insurance Program (August, 1943—November, 1943)

Late in June the Rubber Director repeated his intent to resurvey the guayule situation in the light of the synthetic program as of midsummer and asked the Secretary of Agriculture for recommendations as to any advisable changes. The Secretary proposed in early August several plans by which significant amounts of guayule rubber could be produced in Arizona, California, New Mexico, and Texas without seriously affecting food production.

On August 17, Rubber Director Jeffers stated, "As long as natural rubber has to be mixed with the synthetic product in some products, it is advisable to have as insurance a domestic source of natural crude rubber."

He expressed the opinion that guayule offers a sound insurance policy and suggested that a program be insti-

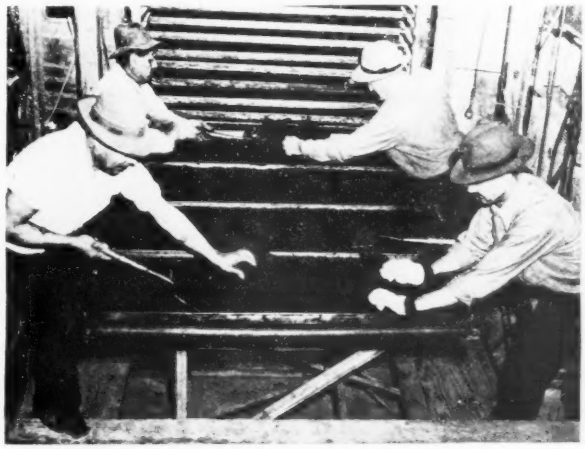

Fig. 5. Guayule Rubber after Washing Is Dried in Vacuum-Driers and Later Pressed into 100-Pound Blocks

[11] WFO 1. Department of Agriculture Release AG-235.

tuted which would produce, within the United States, up to 20,000 tons a year on the basis of three-year irrigated plantings or four-year plantings on dry land.

A request for funds to the amount of $7,500,000 with which to initiate such a program was approved by the Budget Bureau and submitted to Congress for inclusion in the First Deficiency Appropriation Bill for 1944. The House Appropriations Committee rejected the request on the grounds that the additional acreages of guayule shrub contemplated by the extension of the present project would not yield any rubber for use in the war effort unless the war should last beyond 1946.[12] The bill was passed by the House on November 5 with no funds provided for the guayule project.

The Senate Appropriations Committee on December 4 reported that it was "interested in guayule as a source of crude rubber as a sound insurance for the future" and recommended that a revised estimate of $4,100,000 should be restored in the pending appropriation bill. On December 8 the Senate approved the Committee recommendation. After a conference between the House and Senate committees the bill was passed late in December, but with no funds appropriated for the Emergency Rubber Project. It appears that proposed expansion of the guayule project on the basis of providing future insurance for the rubber program, as recommended by the Office of the Rubber Director, will not be realized. The method and rate of disposal of the shrub now growing on the 32,000 acres planted will depend upon future action by Congress.

Rubber Production

Guayule has been grown successfully in the Salinas Valley of California for many years by the Intercontinental Rubber Co. Although experiments with irrigated lands were undertaken, experience led the company to utilize unirrigated lands as the safest and cheapest operation, with the object of maturing a crop in about four years. The Forest Service started plantings on unirrigated land in conformity with the company's procedure, but analysis of the available, but slender amount of experimental information related to guayule culture led to the belief that guayule probably could be grown successfully on irrigated lands, if carefully handled, to a millable size and rubber content in about half the time normally required on unirrigated lands in the cool coastal valleys of California. At present good crops of guayule are growing on irrigated and unirrigated land. Rubber production in plots on irrigated lands is nearly three times as large as on unirrigated lands after ten months' growth from transplanting.

In the Spring of 1943 the reconditioned Spence Factory produced 393 long tons of underesinated rubber at a cost of about 28¢ a pound which includes the appraised price of the shrub of 10¢ a pound, from a 550-acre field planted in 1930 on land subsequently acquired by the United States. This was the only mature cultivated shrub available and provided the first natural rubber to be produced on an industrial scale in the United States since Pearl Harbor. It was sold to the Rubber Reserve Co.

In the Fall of 1943 the factory resumed operations. Shrub for this purpose was gathered from scattered patches of wild plants growing in the Big Bend section of Texas, the only part of the country where guayule grows wild. Provisions were made in the harvesting operations to leave sufficient guayule on the range to insure future reproduction of the plants. Total rubber production will be about 200 long tons, which represents all the rubber that can be obtained from this source at the present time.

Since the shrub planted by the Emergency Rubber Project is not yet old enough to yield satisfactory quantities of rubber none of it has been harvested for production purposes. It is impossible, therefore, to determine accurately by actual experience how much it will cost per pound to produce guayule shrub under present operating conditions. Positive information is not yet available concerning the volume of two-year-old shrub that can be produced per acre on irrigated land, nor what the rubber content of such shrub will be when it is milled.

How much rubber can be produced from the 32,000 acres of plantations established in 1942 and 1943 will depend upon many factors, such as the age of the shrub when harvested and the number of surviving plants. Referring again to the statements made by Congressman Stefan in the House on December 6, it was stated that the earliest date on which milling could begin would be in the Fall of 1944. Should these plantations then be milled at the maximum practicable rate, the operation would be terminated by June, 1947. It is estimated that from 9,900 to 12,500 tons of rubber should be recovered in this period; the total volume depends on whether maximum rate of production in fiscal years 1945 and 1946 were desired, or a more even spread of production over fiscal years 1945, 1946, and 1947 were preferred. The latter procedure would produce the 12,500 tons of rubber at a cost of about $1.94 a pound; while the former would produce 9,900 tons of rubber at a cost of approximately $2.43 a pound. A liquidation program designed to produce the possible maximum of rubber from the 32,000 acres would begin milling at a slow rate in 1944, increase the annual production rate later, and extend the milling period into 1951. It is estimated that under the most favorable circumstances this would produce 29,000 tons of rubber at a cost of about a dollar a pound. In conclusion it is stated that in making the above calculations, the residual value which might remain at the termination of the enterprise in some 13½ million dollars worth of capital investment is ignored. At present, capital investments represent about 40% of the total expenditures.

Cost of operations to date are high and undoubtedly can be lowered in the future. This is due in a considerable measure to the present experimental and developmental nature of the program, but probably more importantly to the fact that between September, 1942, and March, 1943, an organization, improvements, and facilities were developed to execute a much greater program than was subsequently carried out.

It has been estimated by a representative of the Office of the Rubber Director that on a long term basis, crude guayule rubber from cultivated shrub can be produced for about 30¢ a pound in the United States, with farmers growing the shrub on a contract basis and private industry doing the processing. The cost in Mexico should be less than 20¢ per pound.

Studies of Improved Operating Methods

Concurrent with nursery and plantation activities, intensive studies have been conducted to improve the cultural methods previously employed. Application of preliminary results from these investigations has already brought about lower production costs. A large amount of factual information has been developed which indicates the possibility of radical changes in the technique of growing maximum rubber in the shortest time at the least cost.

Development of Agricultural Machinery. Department of Agriculture experts in farm machinery, aided by manufacturers and farmers, succeeded in developing new machinery and adapting conventional equipment that resulted in significant economies. As an example, improved seed collectors were used to pick approximately 250,000

(Continued on page 370)

[12] House Report 822, 78th Congress, 1st Session, p. 33.

Wartime Control of the Rubber Industry in Australia

Howard Daniel and Minnie Belle

IN A war on wheels rubber is a precious commodity, and Australia, as the main United Nations base in the Southwest Pacific, has had to go all out to conserve her scanty supply. To provide rubber for vehicles carrying soldiers and Army stores, and for the manufacture of other products directly connected with the war, all non-essential production and uses of rubber and rubber goods have been curtailed. Since Pearl Harbor and the loss of the rubber producing areas in Malaysia, particularly those close by in New Guinea and Papua, some of which are now being returned to production, increasingly stringent control of rubber has been necessary. This control has been exercised in two ways—through restrictions on the manufacture of rubber products and through regulations of the distribution of motor tires and tubes.

Restrictions on Rubber in Manufacture

A series of regulations were consolidated into Rubber Order No. 8 on August 2, 1943, which is the Australian equivalent to WPB Order R-1. Under this order articles containing rubber of any kind (raw, crude, reclaimed, scrap, synthetic, balata, gutta percha, latex) will no longer be manufactured unless for supply to federal or state governments, or for use as component parts in the production of goods (other than tires and tubes) to fulfill federal or state contracts. However the following items essential to the operation of military and essential industrial transport are exempted: motor car tires and tubes, motorcycle tires and tubes, motor truck tires and tubes, tires and tubes for roadmaking machines, airplane tires and tubes, belting, V belts, battery boxes, cables, insulating tape, hose (mechanical), hose (A.R.P.), Kromhyd and similar footwear soling material and heels, cycle tires and tubes, milking ware, tread dough and all tire and tube repair material.

In addition to these general restrictions the manufacture, distribution, and consumption of any articles containing latex are completely prohibited. Severe production quotas restrict the manufacture of cycle tires and tubes, milking ware, and tread dough: only one grade of cycle tires or cycle tubes may be produced, and this is limited to 50% of the average monthly quantity produced in 1941; milking ware production is limited to 75% of the average monthly quantity in 1941; and tread dough to 50%.

The limited quantity of rubber available for the manufacture of rubber articles is protected by prohibitions on new plant and new production and by restrictions on the types and sizes of rubber articles. To provide for any special situations the Controller of Rubber in the Department of Supply and Shipping, who administers the rubber order, may issue further directions relating to the use or consumption of rubber and the manufacture and distribution of rubber articles.

Retreading, recapping, and repairing of tires are also under control. Except for a distributer, tires may be repaired, recapped, or retreaded only for holders of licenses endorsed with certain priorities.

Motor Tires and Tubes

The sale and distribution of motor tires and tubes are closely regulated by sections of the rubber order establishing sales quotas and by the provisions for the release of tubes in the Control of Rubber (Distribution of Motor Tires and Motor Tubes) Order, August 2, 1943.

Manufacturers may not sell more motor car tires or motor car tubes than 25% of their average weekly sales during the months of September, October, and November of 1941; motorcycle tires or tubes in excess of 25% of average weekly sales in the same period; motor truck tires or tubes in amounts greater than 37½%; motor tractor tires or tubes in excess of 33⅓%; cycle tires or cycle tubes in excess of 50%; milking ware, 75%; tread dough or tire or tube repair materials, 50%. Tires or tubes for roadmaking machinery may not be sold unless for federal or state roadmaking authorities or for civilian defense organizations.

The order covering distribution of motor tires and tubes aims at controlling the release of motor tubes and tires (used as well as new) by requiring certain information about stocks and end uses from those who apply for them. With the exception of manufacturers or distributers, tires may be obtained only by permit holders who have licenses listing priority ratings and who do not already possess usable tires. What happens is that anyone requiring a tire in Australia must file an application with the Controller of Rubber, but before the tire distribution branch of the Rubber Controller's office actually releases the tire, this form is considered and passed upon by the local authorities which have special knowledge of local transportation problems—the tire distribution branch of the individual state, the State Liquid Fuel Control Board, and the Emergency Road Transport Directorate where final recommendation is made. This elaborate screening machinery limits the release of tires to those whose need is beyond doubt.

Conservation of Rubber

Further and ancillary measures to conserve rubber are gasoline rationing and the speed limit imposed on motor vehicles. Gasoline retailers may not purchase liquid fuel unless they hold a license, and consumers must furnish ration coupons for each purchase. These coupons can be obtained only by consumers holding licenses issued on a basis of essentiality. Non-essential civilian use of automobiles has been practically eliminated, and the requisitioning of all tires and tubes of non-essential civilian autos is presently receiving consideration. Autos must not exceed the 30-miles-an-hour speed limit on any public highway in the Commonwealth without the consent of the Commonwealth or one of the local transport authorities.

Rubber Supplies

Australia's prewar consumption of rubber was approximately 16,000 tons; there were some 300 factories manufacturing such miscellaneous rubber goods as tires, tubes, car accessories, repair materials, transmission, conveyer, and elevator belting, hose, packing. Lend-Lease has jacked up the need of rubber since Australia is fulfilling the rubber tire requirements of American forces in Australia from her own supplies. The increasing momentum of the war in the Pacific has augmented the demand

(*Continued on page 374*)

Recent Russian Literature on Natural and Synthetic Rubber—VI

M. Hoseh

Formula for Calculating the Viscosity of Latex. B. M. Kegrov, *Kauchuk i Rezina*, 29-31 (1938) **N-5.**

The author analyzed a recent formula for calculating the viscosity of latex[1] and found it incorrect. He derives formulae, of which

$$\eta = \frac{K\,(p_1 d_1 + p_1 d_{Hg}) - (p_2 d_1 + P_2 d_{Hg})}{w_1 t_2 - w_2 t_1} \times t_1 t_2 d_1$$

and a simplified form follows:

$$\eta' = \frac{K\,(p_1 - P_1) - (p_2 - P_2)}{w_1 - w_2} d_{Hg} d_1 t$$

In these formulae η' is the coefficient of viscosity, K an apparatus constant depending on the length and radius of the capillary, p_1 and p_2 the hydrostatic pressure of the latex column in two determinations respectively, P_1 and P_2 the air pressure in two determinations respectively, w_1 and w_2 the weight of latex flowing out at pressures P_1 and P_2 in time intervals t_1 and t_2, d_{Hg} and d_1 the densities of Hg and latex respectively, and t time, when $t_1 = t_2$ in the simplified formula.

Thermal Decomposition of Methane to Carbon Black on a Semi-Plant Scale. N. M. Indyukov, T. V. Prokof'eva, and M. A. Lempert, *Kauchuk i Rezina*, 7, 36-44 (1938). **M-13.**

A natural gas containing 92-98% of CH_4 and higher members of this series was decomposed in a refractory-lined generator to carbon black. Decomposition temperatures of 1100-1350° C. were tested. The lower limit is unsuited because of small yield and poor quality of the product. To work above the upper limit proved undesirable because of disintegration of the refractory brick. The optimum temperature was 1150-1250° C. The tested rate of flow of the gas was 5.6-46.3 cu. m. per hour. (197.7-1635 cu. in. per hr.). The optimum rate was found to be 20.0 cu. m. per hr. (706.3 cu. in. per hr.). Two kinds of carbon black were produced: Thermax and P-33 (designated as KC_1 and KC_2 respectively). In producing the two, the difference consisted in mixing the incoming fresh gas with the exhaust gas in case of P-33.[2] The equipment used is described and a schematic flowsheet is given. In these tests up to 90% of the methane was decomposed. On the basis of C in the feed gas a yield of 40% of carbon black was obtained. Individual experiments gave considerable higher yields. The carbon black was tested in SK alongside imported similar kinds. The amounts of carbon black used in compounding were 20, 40, 60, 80, and 100% of the SK. The results were entirely satisfactory. Of the two, Thermax and P-33, the latter proved superior. The exhaust gas from the process contained 82.2% of hydrogen which makes it suitable for hydrogenation purposes.

On the Behavior of Rubber in Solutions. V. B. Margaritov, *Kauchuk i Rezina*, 8/9, 23-34 (1938). **SN-16.**

By solvation is understood the interaction between the dispersed phase and the medium within which it is dispersed. Generally two kinds of solvation can be distinguished: volume and surface. The first occurs when the medium, as a result of osmotic pressure and mechanical adhesion of the medium to the colloidal particles, penetrates inside the micelle. Surface solvation occurs when molecules of the medium are adsorbed on the surface of the micelle. On the basis of accumulated data it is justified to conclude that the typical properties of lyophilic colloids, to viz., anomalous viscosity, swelling, etc., are induced by volume solvation; while surface solvation is largely responsible for the stability of a lyophilic colloidal suspension. Therefore the behavior of rubber in solution reduces itself to the solvation of rubber in its dispersing medium and to the effect of the degree of solvation on the properties of a rubber sol. The behavior of rubber suspensions was studied on a number of solvents and at various temperatures. The solvents could be divided into two classes: those with small molecules and those with large ones. The small molecule hydrocarbons, forced by osmotic pressure, penetrate inside the micelle, cause it to swell, and generally induce volume solvation. In these solvents rubber sols consist of large expanded micelles, display an anomalous viscosity, higher values of θ (critical pressure in the Bingam equation), and are opaque. The scattering of light by rubber in carbon tetrachloride, chloroform and heptane is 7400 Å, 6148 Å, and 5900 Å respectively.[2] In solvents of large molecules the solvation of rubber is on the surface of its micelles. Such sols closely approach suspension. In solvents such as nonane, octane, and others there are also present "loosened" micelles, and in the case of small concentrations, macromolecules. As was stated above, surface solvation increases the stability of a sol. Experiments on coagulating a rubber sol with acetone showed that increasing quantities of the coagulant were required in going from carbon tetrachlorde to hexane to octane.

Unlike natural rubber, the divinyl polymer is not subject to volume solvation. The author explains this point by the lack of a well-developed micellar structure in divinyl polymers. The absence of volume solvation accounts for the lack of characteristics peculiar to lyophilic colloids in synthetic rubber.

The Effect of Plasticizers on the Properties of Rubber Synthesized from Divinyl. S. L. Talmud, T. I. Yurzhenko, and Y. N. Vasil'eva, *Kauchuk i Rezina*, 8/9, 34-45 (1938). **S-27.**

In this investigation the authors set forth to explain the chemical and physico-chemical properties of plasticizers, properties which determine the behavior of plasticizers in SK. Further, they have searched for new

[1] *Ind. Eng. Chem. (Anal. Ed.)*, 9, 182 (1937). Editor's Note: See also *Ind. Eng. Chem. (Anal. Ed.)*, 11, 377 (1939) and *Rubber Chem. Tech.*, 14, 137 (1941) for further discussion of this matter.
[2] Cf. S. D. Gehman and J. E. Field, *Ind. Eng. Chem.*, 29, 793 (1937).

suitable plasticizers to satisfy the demands of the constantly growing SK industry. They investigated the products and by-products of coal tar, cracking and oil pyrolysis. These substances were chosen because among them are many high-boiling, non-saturated compounds and because they are available in large quantities. The following substances were investigated: (a) products of cracking, oxidized and unoxidized distillates, residue from the Winkler-Koch process, kerosene and cracking polymer; (b) products of naphtha pyrolysis, light oil, solvent, tar collected in coolers, liquid pitch and green oil; (c) coal-tar products, solvent naphtha, hard pitch, absorbent oil (230-280° C. fraction freed of naphthalene), soft pitch, heavy xylol fraction, anthracene oil, medium light oil, crude anthracene, spent absorbent oil (used in scrubbers for two to three months), solvent II. In addition crude oil was tested. The relative viscosity (Engler), surface tension (Kantor-Rebinder), degree of unsaturation, fractionation data (Engler), and specific gravity of these substances were determined. Plasticizers can be generally divided into two classes: true plasticizers or substances which dissolve rubber, and pseudo-plasticizers or substances which disperse rubber. With this in mind the rate of dissolution and the extent of swelling of SK samples in the above substances were determined. The results are tabulated. In some instances where the viscosity of the tested substance was too high, the dissolving capacity and the swelling were determined in a 1:1 mixture with benzene. The effect of various amounts of these substances was tested in two compositions of SK, and the results were presented in a number of curves. It can be seen from the presented data that light oil, oxidized press-distillate, anthracene oil; fluid, soft and hard pitch; tar collected in coolers and the residues from the Winkler-Koch process are suitable as plasticizers for the rubber industry. It is apparent that products derived from coal tar and naphtha pyrolysis are preferable. Generally, the more unsaturated substances gave better results. The authors point out the results of other investigators who found that for natural rubber less unsaturated substances were preferred as plasticizers. The authors also re-emphasize the hazard of applying results obtained for natural rubber to SK. The substances investigated were non-polar. A similar investigation on polar substances, as acids, alcohols, amines, etc., is planned.

Rubber from *Kok-Saghyz* and Technological Properties of Rubber from *Kok-Saghyz*. B. V. Fabritsiev and M. T. Vishnevskaya, *Kauchuk i Rezina*, 8/9, 45-49; 11, 13-17 (1938). **N-6.**

The technical properties of *kok-saghyz* rubber are described. The properties of this rubber and the properties of its mixtures with SK are discussed. The compounding of this rubber is given.

Electromagnetic Automatic Micrometers for Continuous Measuring of the Thickness of Rubber. A. B. Levin, *Kauchuk i Rezina* 8/9, 49-56 (1938). **SN-17.**

Automatic control of the thickness of a calendered sheet is of paramount importance. It results in considerable economy, insures uniformity of the product, and eliminates the bothersome task of cutting out samples periodically and measuring their thickness by hand. Several types of automatic micrometers, both Russian and foreign, are described.

Determination of the Hardness of Rubber. V. M. Shamikov and G. S. Izraelit, *Kauchuk i Rezina*, 8/9, 57-60 (1938). **SN-18.**

The authors discuss several methods for measuring hardness of rubber. They dwell at length on the apparatus of Adams, which they consider the most suitable.

Stamping Rubber Goods. E. B. Chernoshvarts, *Kauchuk i Rezina*, 8/9, 64-74 (1938). **SN-19.**

The principle of stamping rubber is explained. The behavior of rubber is shown diagrammatically when it is stamped between two evenly cooled surfaces and between two unevenly cooled surfaces. In these two cases the rubber is hot, and the compressing surfaces are cooled. Next is illustrated the case when cold rubber is compressed between heated plates. The stamping process is preferable to the molding process for rubber goods with a textile carcass. The details of stamping rubber overshoes are discussed, and the equipment used is described. The economic aspects of the process are discussed. Stamping is compared to molding. The former is more advantageous. Stamping enables the use of 100% SK.

Optical Studies of the Surface of Rubber. Y. B. Dubinker, K. I. Samarina, and L. S. Frumkin, *Kauchuk i Rezina*, 10, 17-22 (1938). **SN-20.**

Changes in the nature of rubber effected by various causes are most frequently reflected in the surface of rubber. Thus rubber exposed to light changes the color of its surface, and frequently the latter becomes cracked. Swelling changes the sheen of rubber and at times also its color. The blooming out of sulphur becomes noticeable on the surface, etc. It should therefore be possible to estimate accurately the nature of changes which occurred in rubber by optically examining its surface. The main characteristics which the authors consider indicative in determining such changes are: (1) the main angle of incidence, i.e., the angle of incidence of light on the examined rubber at which the reflected light is maximum polarized; (2) the degree of polarization of light reflected by the rubber impinging at an angle equal to the main angle; (3) intensity distribution of the scattered light in various directions, and the change in the light's spectral composition as affected by the angle of incidence; and (4) the relation between eliptical polarization of the reflected light and the rotation of the plane of polarization of straight-line polarized light impinging on the rubber. The theoretical bases underlying the above points are briefly discussed. The authors constructed an apparatus and with its aid made optical determinations. For the present they have limited their investigation to determination of the main angle of incidence and degree of polarization of light reflected from a rubber surface, and how these two quantities are affected by the composition of rubber, degree of vulcanization, aging, swelling, and stretching. Light from a standard source impinges on a piece of rubber fastened on a movable stage. The reflected light passes through a lens and a Nicol prism and falls on to a photoelectric cell connected to a mirror galvanometer. The results are presented on curves and are self-explanatory. Thus two samples of rubber of exactly the same composition and similarly prepared were examined. One sample remained untreated; the other was kept in distilled water for two days at 25° C. The main angle of incidence for the untreated sample was 58° and for the treated 62°. The degree of polarization also increased. Other results are quoted. In the opinion of the authors these preliminary results amply justify further development of this method.

Viscosity Constant of Latex. B. M. Kedrov, *Kauchuk i Rezina*, 10, 25-30 (1938). **SN-21.**

The coefficient of viscosity of latex determined by the

flow through a capillary method has different values depending on the diameter of the capillary and on pressure. Nor are the values obtained with a Stormer viscometer consistent. The most accurate of the available methods is that of Jordan, Brass, and Roe.[3] Using two apparatus described by Jordan et al., the author tested the presence of the constants limiting coefficient of viscosity (η') and yield point (F_0) in latex. The following latex solutions were tested: 30% synthetic latex, 76.1% Revertex-standard, 20% Revertex T, 61.9% Revertex T, and 62.5% Revertex T. It was found that η' is constant is constant for all kinds of rubber and is independent of either the apparatus or the pressure. The results were most consistent for the 20% Revertex T. For this solution the results did not deviate from the mean by more than 1%. For synthetic latex the deviations from the mean did not exceed 2%. For the rest of the solutions the deviations from the mean did not exceed 4%, except in one case. The other constant F_0 remained constant only for Revertex-standard and synthetic latex. In the other cases it varied with the apparatus and pressure. The reason for the divergent results of F_0 are not yet fully understood and need to be investigated further.

(To be continued)

Guayule Rubber Production

(Continued from page 366)

pounds of clean guayule seed during the 1943 harvest at less than 20¢ a pound untreated. Comparable costs with pickers used previously were about 30¢ a pound at prewar labor rates. This saving was accomplished by the development of an entirely new, inexpensive four-row seed picker which gathers seed from 15 acres a day, in contrast to the seven or eight acres a day covered by the two-row machine formerly used.

A commercial planter costing about $500 was adapted for handling guayule seedlings. It operated more efficiently than a locally designed and constructed machine that cost twice as much at prewar labor and material prices. The new four-row machine uses a ten-man crew and plants from eight to ten acres a day, depending on soil, weather, and other conditions.

DEVELOPMENT OF CULTURAL PRACTICES. Because the original seed supply was so limited and immediate planting so important, the Emergency Rubber Project immediately adopted the methods successfully developed by the Intercontinental Rubber Co. for a relatively small operation in the Salinas Valley. Subsequently, as the operating area expanded and large-scale activities provided invaluable experience, the project was able to introduce improvements from time to time. For example, when the nursery program was expanded beyond the Salinas Valley, more porous soils were selected, and the duckboards previously needed to support nursery machinery were eliminated at a saving of about $500,000. Dispensing with the duckboards also reduced nursery sowing costs substantially by reducing the hand labor needed to lay the duckboards before sowing and the removal, storage, and repair of the duckboards at the end of the nursery growing season.

The development of suitable oil sprays for controlling weeds in the nurseries greatly reduced weeding costs. Labor requirements for weed control in the plantations were cut in half by using oil sprays.

Experimental plantings have demonstrated that good stands of guayule can be obtained by direct seeding under certain conditions on irrigated land, but land preparation, irrigation, and weeding problems must be overcome before direct seeding can be employed extensively. The time-consuming nursery and transplanting step in guayule culture would be eliminated if methods of direct seeding can be developed for areas where the soil and the climate and other conditions might make direct seeding feasible on a large scale.

These are but a few examples of established and potential improvements resulting from research by the Bureau of Plant Industry, Soils, and Agricultural Engineering, designed mainly to solve current problems in the production program. Indicator plots, now totalling 138 and extending from northern California to southern Texas, are "indicating" the adaptability of guayule to the various soils, climates, and other conditions within this wide range. In general these small test plots show to date that guayule grows better and forms more rubber in the warmer climates than in the Salinas Valley along California's central coast. The plant varieties generally used were found to be adversely affected by low temperatures, serious injury occurring at temperatures which were in the neighborhood of 0° F.

Nine experimental plantings of 40 acres or more have been made in the most promising areas of the Southwest. These plantings are used to determine the best spacing, seasons, and methods of planting, cultivating, fertilizing, irrigation, and weed control—all looking toward more efficient and economical operations.

Studies of soils are also in progress to determine the soil fertility and moisture requirements of guayule for maximum growth and rubber formation.

A good beginning has been made toward an understanding of the biochemical process within the plant, concerned with the formation of rubber and related hydrocarbons. Studies are under way also on the effect of external conditions on the rate of rubber development and total content of rubber, such as heat and cold, days' length, nutrition, drought, and competition. Results thus far indicate that apparently it is possible to grow the shrub quickly on irrigated land to a large size and then slow down growth by proper manipulation of cultural treatment to encourage rubber storage.

Rubber Extraction Investigations

Extensive studies of rubber recovery have been made by the Bureau of Agricultural and Industrial Chemistry at its Eastern Regional Research Laboratory at Philadelphia and in a pilot mill installed at Salinas. The immediate problem was to develop a method by which good rubber could be obtained from immature two-year-old shrub despite the low rubber content, high resin content, and abundant foliage of young shrub.

The results of these investigations are described in a separate article, which will appear in a forthcoming issue of INDIA RUBBER WORLD.

A NEW SERIES OF SYNTHETIC RESINOUS CONDENSATION products called Amerigums, which are reported to impart exceptionally high tear resistance, tensile strength, and elongation to GR-S and other synthetic rubbers has been announced by American Alkyd Industries, Inc., Broad and 14th St., Carlstadt, N. J.

[3] *Ind. Eng. Chem. (Anal. Ed.)*, 9, 182 (1937).

Advances in Rubber during 1943[1]

J. W. Liska[2]

WAR censorship has kept information on many of the technological advances made in 1943 from public knowledge. Paradoxically, however, one of the greatest of these advances is an achievement unparalleled in United States industrial history which was so successful that widespread publicity, rather than secrecy, has been the rule. The Baruch Report (1)[3] dated September 10, 1942, disclosed, among other things, the fact that unless seemingly impossible quantities of synthetic rubber were produced during 1943, the entire course of the war might easily be altered. Some privately financed and government owned synthetic rubber plants were already in production at the time of the release of the Baruch Report, though the total amount of synthetic rubbers of all types actually being produced was probably under a rate of 50,000 tons per year. Extensive plans, too, had been made for the building of huge plants at the time of the release of the report. A "standard design" copolymer plant with an annual capacity of 30,000 tons had been established, based on experiences gained in the plants already in production. A sufficient number of these standard plants to produce the required total amount of synthetic rubber was then scheduled, and construction on some of these was begun as early as September, 1942. Announcements of the completion dates of these and related butadiene and styrene plants began to appear early and continued throughout the year (2-9). The largest of the copolymer plants (9) is scheduled to produce GR-S at the rate of 120,000 long tons annually. This is equivalent to approximately 600,000 acres of rubber plantation, each acre of which has about 120 trees and each tree requires 150 tappings per year. The latest available public report on production of synthetic rubber was given by Col. Bradley Dewey at the one hundred and sixth meeting of the American Chemical Society held in Pittsburgh, Pa., September 6 to 10, 1943. It was reported there that two-thirds of the annual scheduled production of 850,000 long tons of synthetic rubbers had already been completed and that there was every assurance that all the plants would be in operation by the end of the year. Thus this nation near the end of 1943 is already past the danger it once faced of complete collapse of both military and domestic fronts caused by the lack of an adequate supply of "rubber."

The credit for this splendid record of achievement must be shared by research scientists of the rubber, petroleum, and alcohol industries and a large group of chemical, construction, design, and mechanical engineers. As a result of the combined efforts of the above-mentioned groups, this country has been able to design, construct, and put into production, within a time of about two years, plants for the manufacture of synthetic rubbers at an annual rate which greatly exceeds our normal, overall consumption of natural rubber in any year previous to the war. Evidence that this truly remarkable achievement is being recognized is contained in the recent announcement that the American synthetic rubber industry is to receive the 1943 Award for Chemical Engineering Achievement.

Although the primary problem of obtaining an ample supply of rubber has been solved in 1943, many other problems have not been so fortunately concluded. Manpower shortages, shortages of manufacturing equipment and manufacturing capacity are some of the unsolved problems outside of the scope of this report which make conservation of manufactured rubber goods (particularly passenger-car tires) mandatory in spite of the present adequacy of supply of raw synthetic rubber. Still other problems have been the object of many intensive researches, only a few of which, however, have been published.

Rubber Substitutes and Extenders

The search for natural rubber substitutes other than GR-S continued during 1943. The commercial production of Agripol, a synthetic, rubber-like material, was announced late in 1942 (10). This material is one of a class of "chemurgic rubbers" such as Norepol, Vulprene, and Sulprene, which are essentially derivatives of fatty oils. An excellent article giving the properties, uses, limitations, etc., of this type of synthetic rubber has been published (11). Other chemurgic rubbers introduced are Kem-Pol (12) and Witcogum (13). It is claimed that no critical chemicals or equipment is used in the manufacture of the latter two, but like the others, they can only be considered a substitute for rubber in applications where low elongation and low tensile properties can be tolerated. An interesting new development was revealed in the announcement (14) that sponge rubber could be produced from some of these chemurgic rubbers. Although inferior to natural rubber sponge in flexibility and compressibility at normal temperatures, it is claimed to be superior in these properties at low temperatures. A somewhat different polyester rubber named Paracon was also developed and is in limited production as a specialty rubber (15, 16). The tensile and elongation of Paracon are reported to be higher than those of the other chemurgic rubbers mentioned, though no details have been released as to the maximum attainable values of these properties.

A considerable number of non-chemurgic rubber substitutes were also introduced. Although some of these products do not even possess the principal characteristic properties of rubber (high extensibility and tensile strength), their use, wherever possible, resulted in the saving of a considerable quantity of natural rubber. Among these might be mentioned: Bubblefil (17), an interesting substitute for sponge rubber or Kapok, made of cellophane; Haydenite (18), a plastic coating material for raincoats having a polyvinyl butyral base; wood felt (19); cattle hair felt (20), a shock-absorbent material used for padding the interior of tanks; Styraloy (21), a synthetic hydrocarbon elastomer said to possess excellent low-temperature flexibility and electrical properties; Synflex T-11 (22); and Marvinol (23), a thermoplastic material reported to be completely reclaimable and to have excellent air retention properties which make it superior to natural rubber for use in inner tubes.

In the field of adhesives, bonding materials, and tank linings, many of the rubber "substitutes" are proving vastly superior to the natural material. Cycleweld (24) and Reanite (25), bonding processes based on the use of synthetic materials, are reported to produce higher strength bonds between materials of a more diverse nature than had previously been found possible with natural rubber.

[1] Presented before the Rubber & Plastics Group, American Society of Mechanical Engineers, Hotel Pennsylvania, New York, N. Y., Dec. 2, 1943.
[2] Physics Research Division, Firestone Tire & Rubber Co., Akron, O.
[3] Bibliography references are listed at the end of this article.

Substitution of this type of bonding for riveting in certain aircraft and tank applications results in a large saving in manhours and material. The post-war possibilities of this significant advance appear almost unlimited. Details of the Redux bonding process (26), announced by the British, are being kept secret and are available only to those engaged in essential war work. A new adhesive to replace rubber has been announced (27) for use on masking paper. The results of extensive tests on synthetic rubber cements have been published (28).

Literally scores of materials were introduced to the rubber industry, especially in the early months of 1943, as means of overcoming some of the shortcomings of GR-S (low plasticity, low tack) or to "extend" the limited supplies of both GR-S and natural rubber. All of these materials were reportedly made of non-critical chemicals; some served double purposes, such as plasticizer and tackifier or tackifier-extender, etc. Typical of such materials are: Turgum (29), plasticizer and tackifier; Falkomer (30), extender and plasticizer; Synthol (31), tackifier and plasticizer; Plastac (32), processing aid; Galex (33), plasticizer; "Thiokol" TP-90 (34), a low-temperature plasticizer; Syntac (35), plasticizer; Plastender (36), a reenforcing-type plasticizer; Estac (37), tack producing plasticizer; Polymel (38), plasticizer, softener, extender, and general processing aid; Nordb (39), extender; Oroplasts (40), plasticizer and extender; and JMH (41), peptizer for GR-S. The evaluation of this long (though necessarily incomplete) list of materials imposed a serious burden on the testing facilities of the rubber industry, and particularly those of the smaller rubber manufacturers. It is expected that as the supply of GR-S increases, the necessity of using some of these materials (especially the "extender") will decrease proportionately.

Synthetic Rubber Tank Linings

A significant advance in tank linings was marked by the announcement of synthetic rubber linings for concrete gasoline tanks (42, 43). The use of this lining overcomes the tendency of the concrete to crack and allow the gasoline to escape and also prevents the gasoline (particularly high octane fuel) from the deterioration which would result from direct contact with concrete. Conservation of steel, vitally important in 1943, was thus effected, and underground concrete tanks became practicable, an obvious advantage for storage at military depots. Another specialty lining announced was Synflow (44).

Synthetic Rubber Compounding and Testing

Although some of the synthetic rubbers, and particularly GR-S, are quite similar to the natural rubber products, nevertheless some very fundamental differences in physical properties and chemical reactions exist. The effects of various pigments, concentration of pigments, sulphur content, type and amounts of accelerator, antioxidant, softener, activators, etc., on natural rubber vulcanizates all had been thoroughly investigated in continuing researches extending over a period of a number of years. The high state of excellence of the many rubber products was a direct result of the full use of this large fund of information. If the best possible products were to be made from the substitute raw materials, it was imperative that a similar fund of data be accumulated quickly. Intensive researches were begun, and a vast amount of information was freely interchanged at industry-wide committee meetings. Much the largest share of this information was never published in the literature, but was simply handed out to the industry representatives at the various meetings, in the form of mimeographed, confidential reports. As a result of this action, full use of all existing test facilities was made to advance synthetic rubber technology speedily to a high degree during the year 1943. A number of significant papers were published, supplementing the data distributed through committees. These include articles on accelerators (45), sulphur behavior in GR-S contrasted with that in natural rubber (46), blending of various synthetics (47, 48), compounding of GR-S (49), of guayule rubber (50-52), of Butyl rubber (53) manufacturing and processing of synthetic rubbers (54, 55), the effects of various carbon blacks on the various synthetics (56, 57), synthetic cable insulation (58-60), zinc oxide as a pigment (61), and densities of synthetics (62).

Similar significant advances have been made in the field of measurement of physical propertiese of synthetics. New techniques have been developed for the measurement of cut growth (63), heat generation (64), swelling (65), resilience (66), and flex cracking (67). The tear resistance of GR-S vulcanizates after coming into contact with petroleum products has also been investigated (68).

In general, each of the synthetics excels in some one (or more) characteristic property. Papers illustrating such unique properties (69, 70) have assisted the technologist in choosing a particular type of synthetic rubber for a given specialty application.

New uses for semi-conducting rubber (commercially used for the first time in reducing or eliminating static shock on passenger buses) are being found almost daily. Its most recent application is in a new type of deicing device (71). In addition to the unpublished committee reports on this subject, excellent papers on the effect of carbon black particle size on conductivity (72) and the conducting properties of neoprene (73) have been published in 1943.

The physical and mechanical properties of rubber at low temperatures have been the subjects of laboratory investigations for a number of years, though no satisfactory test or evaluation technique had been developed. The substitution of synthetics (some of which became hard or even brittle at relatively high temperatures) in combat vehicles for natural rubber made it necessary to develop new ways of evaluating the low temperature properties of all the elastomers. Descriptions of a number of test techniques were published (74-81), testifying to the importance of this phase of rubber technology in the war effort and to the extremely rapid advances effected. Additional descriptions of new tests were disclosed in papers (as yet unpublished) presented at the fall meeting of the Division of Rubber Chemistry of the American Chemical Society (82).

Synthetic Rubber Products

Although the need of passenger-car tire replacements is still great, the disappointing results of the extensive 1942 search for an "interim tire" left almost no hope for even a partially good solution in 1943. A suggestion for reclaiming millions of passenger-car inner tubes was made near the beginning of 1943 (83), but apparently the disadvantages of tubeless tire operation outweighed the advantages to be gained by adding these millions of tubes to the already huge, unprocessed scrap rubber piles so that no action was taken by the authorities. A carpet-like material impregnated with asphalt has been proposed as a recap for certain light-duty service applications (84). A new "carpet pile" retread has been announced recently (85), but as yet no official decision has been made as to whether or not allocations will be made to produce it in sufficient quantity.

Only a few of the undoubtedly large number of rubber

or synthetic products made for the Armed Forces have been made public. A new life-saving suit employing an interesting all-rubber interlocking zipper has been described (86). An improvement in the efficiency of the self-sealing fuel tanks now being used on certain types of war planes is reported to have been effected through the use of glass cloth (87). The blanket of glass cloth is said to prevent "flowering" of the metal into the rubbery self-sealing material of the tanks. Three new airplane tires introduced in 1943 (88-90) are reported to resist skidding on icy runways, thus aiding pilots operating under winter conditions. Reports on war materials from foreign countries, too, are meager and can only suggest the progress and advances made there. To a new "camel tread" sand tire is ascribed part of the success of the British Eighth Army in defeating Rommel in Africa (91). Results of tests on *Kok-saghyz* tires, started in 1933, have just begun to be reported (92).

Natural Rubber Procurement

Although the principal stress has been placed on GR-S production as a source of rubber in quantity, investigations of other sources have been continued in 1943. Accurate data on the progress and present state of development are extremely difficult to obtain. However it is known that extensive plantings of the *Cryptostegia* vine have been made in Haiti, and tapping by a new high-production technique is reported to have begun (93, 94). An ultimate production of 12,000 tons per year (after completion of the proposed program of 100,000 acres under cultivation) is predicted, though 1943 production was only a fraction of this quantity. Substantial cultivation of *Hevea brasiliensis* has also been started in Haiti, Brazil, Panama, Ecuador, and Columbia. A tremendous amount of effort is being expended to develop these sources even though no appreciable amounts of rubber can be expected for a number of years at best. Vigorous efforts to organize collection of wild rubber in the Latin-American regions have also been pursued (95, 96). The total amount thus collected is difficult to estimate, but even though only a fraction of our total needs, it is an important contribution in view of the desirability of using some natural rubber blended with GR-S in heavy-duty tires. The guayule situation has not been definitely settled as yet. With the completion of the synthetic rubber program very nearly accomplished, expansion of the guayule program is now being urged (97). Another native plant, the Jojoba nut, is reported to yield a rubber-like material of some interest (98). One of the most recent estimates of the total availability of crude rubber places the amount at 180,000 tons per year (93). Of this amount, 110,000 tons were reported to be coming from Ceylon, 40,000 tons from the Western Hemisphere, and 30,000 tons from Africa. The total Liberian production (estimated at 14,000 tons annually) was said to be going to the United States. Several other interesting articles on the subject of rubber in Tropical America, some of them dealing also with post-war prospects, have been published (99-101).

Reports on Research Activities

No report of this nature would be complete without mention of the enormous amount of chemical and physical research which, though largely unpublished, contributed so markedly to the successful solution of our rubber supply problem in 1943. The relatively few papers published on emulsifying agents detergents, etc. (102-104), new or improved methods of chemical analysis (105, 106), and high polymers studies (107, 108) can only serve as indications of the direction in which chemical technology is progressing. In the field of physical analysis, too, increasing use was made of older tools such as the X-Ray diffraction apparatus (109) and the infra-red spectroscope (110). One of the newest and most widely publicized research tools, the electron microscope, was also extensively employed (111) though details are almost completely lacking. New methods for the production of raw materials in large quantities (principally butadiene and styrene) based on the use of both chemurgic (grain alcohol) and petroleum products were found and are described in the literature (112-116). An important symposium on a subject vital to synthetic rubber manufacture—reaction rates—in which the theories and practical knowledge of some of the nation's best minds played prominent parts was held during 1943 (117).

The rayon-cotton tire cord controversy has continued to be a bitterly discussed point (118), but Wm. M. Jeffers' initial stand has been consistently supported; hence rayon is still being employed almost exclusively in heavy-duty synthetic tires for the armed services. Progress reports (119) issued by the Rubber Director have kept the nation informed during the year on one of the most critical situations of the war. There is little doubt that these reports based on frankness and a high degree of accuracy had much to do with the whole-hearted cooperation of the country in the emergency. A somewhat less widely circulated but none the less interesting "report" was the Charles Goodyear Memorial Lecture, "The Second Mile", given in 1943 by L. B. Sebrell (120).

Some of the plastics "substitutes" for natural rubber, like some synthetic rubber, were found to be superior to the original material in some respects and application. Only a very brief mention will be made in this report on such items. The use of plastics for packaging of war goods (121), and plastics, natural and synthetic rubbers as protective agents against war gases (122) were described in published articles. Interesting postwar possibilities are contained in the reports on synthetic resin emulsions for paper saturation (123) and the use of rubber airbags in applying omni-directional pressure in molding of space-curved plastic-plywood (124). It should be emphasized that these are but a small fraction of the large number of such reports which would be more properly included in the report on the advances in plastics during 1943, and, hence, to avoid possibilities of duplication, are not enumerated in this report.

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Wartime Control in Australia

(Continued from page 367)

for tires for aircraft and trucks, and at the same time it is restoring some of the rubber areas to Australia. The Australian-New Guinea Control Board is supervising the return of planters and workers to the rubber producing regions as they are recaptured from the Japanese. In some sections of Papua native labor has begun working rubber trees which can produce 1,500,000 pounds annually. While this is not much, the supply situation is so bad that nothing is being neglected. Experiments are being made with the Russian dandelion, *Cryptostegia*, Mexican guayule, Australian wild rubber vine (native to Queensland), the cotton bush, and the wild fig, and with synthetic rubber from an Australian formula.

Specification for GR-S

Specification Limits[1]

I. General

All GR-S shall be free of foreign or extraneous material, which is objectionable in normal rubber practice.

II. Chemical Tests

Test	Specification
A. Acetone extract	10.00% maximum
B. Heat loss	0.75% maximum
C. Fatty acid (as stearic acid)	3.00% minimum to 6.00% maximum
D. Soap (soluble as sodium stearate)	0.75% maximum
E. Ash	1.50% maximum

III. Physical Tests

A. Viscosity of GR-S
ML 212° F. @ 4'
45 minimum
55 maximum

B. Viscosity of Compounded Stock
ML 212° F. @ 4' 80 maximum
MS 212° F. @ 4' 40 maximum

C. Test on Vulcanizate at 82½° F.

Cure @ 292° F.	25'	50'	90'
Tensile strength—minimum	2500 psi		
Elongation—minimum	500%		
Modulus @ 300%—minimum	400 psi	800 psi	1000 psi
Maximum	900 psi	1300 psi	1600 psi

Sampling Procedure

I. Method and Blending

The minimum number of samples to be taken for test is one for every 7500 pounds (100-bales) of GR-S. Approximately ½-pound samples shall be taken from the inside of the bale by punch or other means. This sample, free of dusting material, shall be massed five times without banding on a laboratory mill having rolls 6-inch in diameter by 12-inch long, using a roll temperature of less than 130° F. The mill roll opening shall be 0.094-inch (3/32-inch) to 0.125-inch (⅛) as determined by a lead slug. In passes two, three, and four through the mill, the sample shall be doubled upon itself; the fifth pass shall be an attempt to sheet out the sample. The sample shall not be allowed to band on the mill at any time. From this massed GR-S, samples to be run in the Mooney viscometer shall be prepared. These samples shall be as symmetrical, uniform in thickness, and free from porosity as it is practical to make them. They shall be of such size and shape that one solid piece below the rotor and one solid piece above the rotor will completely fill the die of the Mooney viscometer.

The remainder of the massed samples shall be combined in consecutive lots to represent not more than 75,000 pounds (1,000 bales) of GR-S. The combined samples shall be blended on a laboratory mill having rolls 6-inch in diameter by 12-inch long, using a roll temperature of less than 130° F. The rubber shall be passed through the mill twice at an opening of 0.055-inch ± 0.005-inch and then passed through the rolls five times at an opening of 0.030-inch ± 0.005-inch, being rolled back on itself and fed in endwise.

II. Blended Sample Utilization

1. Chemical analysis ½ pound
2. Physical testing 1 pound
3. A stock sample of 1½ pounds may be filed for future reference.

Method of Analysis

I. Chemical

A. Acetone Extract. Cut or tear the GR-S into small pieces approximately ½-inch by ½-inch and accurately weigh a two-gram sample. Place the weighed sample in a 400-500 ml. wide-mouth flask to which has been added 80 ml. of acetone. The sample thickness should not be more than 0.030-inch when it is placed in the flask. Cover the flask with a watch glass, and allow it to stand at room temperature for two hours. Then place the covered flask on a steam plate heated to such a temperature that the acetone will evaporate to approximately 60 ml. over a period of 30 minutes. (It may be necessary to place paper towels between the flask and the hot plate to slow down the rate of heating.) Remove the flask from the hot plate and decant the remaining acetone into a weighed 100 ml. beaker which has been dried for one hour at 70° C. Wash the flask and the GR-S three times with small portions of acetone, adding the washings to the acetone extract in the beaker. Slowly evaporate the acetone on the steam plate. Remove the beaker just before the last traces of acetone are evaporated and allow the final evaporation to take place at room temperature. Place the beaker and extract in a 70° C. oven for one hour. Cool in a desiccator and weigh as rapidly as possible.

Calculations

$$\% \text{ Acetone extract} = \frac{100\,(A - B)}{C}$$

A = weight of beaker plus dried extract residue
B = weight of beaker
C = weight of original GR-S sample

PRECAUTION: DO NOT HANDLE ACETONE NEAR AN OPEN FLAME

B. Heat Loss. Approximately two grams of material are accurately weighed into a tared porcelain crucible of 30 ml. capacity, having a top diameter of 45 mm. and a height of 30 mm. which has been ignited in a 550° C. ± 50° muffle furnace to constant weight. Place in a 105° C. oven for exactly two hours. Remove, cool in a desiccator, and weigh.

Calculation

$$\% \text{ Heating loss} = \frac{100\,(A - B)}{C}$$

A = weight of crucible and sample before heating
B = weight of crucible and sample after heating
C = weight of sample

No part of the oven used should vary more than 1° C. from the designated temperature.

C. Determination of Fatty Acid. Accurately weigh a two-gram sample of GR-S into a 400-500 ml. wide-mouth flask containing 80 ml. of freshly distilled acetone. The thickness of the sample, when it is placed into the flask, should not exceed 0.030-inch. Allow the GR-S to stand in the acetone at room temperature for two hours. Boil for ½ hour on a steam plate at such a rate that the volume will be decreased from 80 ml. to about 60 ml. Remove from the steam plate and add 8-10 drops of thymol blue and phenolphthalein indication.[2] Titrate with 0.1 N sodium hydroxide to within approximately 0.25 ml. of the end point. This point may be determined by the slow return of yellow color after the addition of a drop of sodium hydroxide. Add 60 ml. of water and proceed with the titration to a blue color. Blanks must be run.

Calculations

$$\text{Total acidity expressed as \% stearic acid} = \frac{A \times B \times 28.4}{C}$$

A = volume of standard sodium hydroxide used in the titration
B = normality of the standard sodium hydroxide
C = weight of rubber sample

D. Determination of Soap. Accurately weigh a four-gram sample into a 400-500 ml. wide-mouth flask and add 100 ml. of benzene. The sample thickness should not be more than 0.030-inch when it is placed in the flask. Heat at 60-75° C. on a steam plate for two hours. Add 25 ml. of ethyl alcohol slowly with vigorous shaking to prevent the coagulation of the rubber. Continue the heating for ½ hour. Remove the flask from the steam plate and add 50 ml. of ethyl alcohol all at once. Add 8-10 drops of brom phenol blue indicator (0.1% BPB in 20% ethyl alcohol) and titrate while hot with 0.05N HCl to a pure yellow color. Run blank determinations.

Calculations

$$\text{Alkalinity expressed as \% sodium stearate} = \frac{A \times B \times 30.6}{C}$$

A = volume (ml.) of hydrochloric acid used in the titration
B = normality of the hydrochloric acid
C = weight of the GR-S sample

PRECAUTION: DO NOT HANDLE BENZENE NEAR AN OPEN FLAME

E. Ash Determination. Accurately weigh a five-gram sample into a crucible which has been previously ignited to constant weight at 550° ± 50° C. Place the crucible in the muffle furnace, the temperature of which is 100° C. or less, and heat gradually to 550° ± 50° C. Heat for three hours or more at this temperature. Remove the crucible from the furnace, cool in a desiccator to room temperature, and weigh immediately.

Calculations

$$\% \text{ Ash} = \frac{100\,(A - B)}{C}$$

A = weight of crucible + ash
B = weight of crucible
C = weight of sample

II. Physical

A. Mooney Viscosity. 1. *On GR-S.* The massed GR-S sample, prepared according to the procedure under I, Method and Blending, shall be aged at room temperature at least 30 minutes before the viscosity determination is made.

The viscosity of the GR-S shall be determined on the Mooney viscometer with a one-minute warm up at 212° F.

The viscosity shall be the minimum reading of the dial observed between 3 minutes 45 seconds and 4 minutes 15 seconds. When the viscosity is outside the specification limits by one unit or less, viscosity shall then be determined as follows:

Take and record readings of the dial at five-second intervals from three to five minutes. Plot these readings against the time. Draw a smooth curve through the minimum points of each periodic fluctuation, or

[1] All specification limits include the tolerances of the test method. Any lot represented by a sample which fails in one or more tests to meet the specification limits may be retested. For this purpose two additional samples shall be selected. Failure of either in any respect shall be cause for rejection.

[2] Thymol blue and phenolphthalein indicator—(1 part of 0.25% thymol blue in 50% alcohol and 3 parts of 0.25% phenolphthalein in 50% alcohol).

through all points if there are no fluctuations. Take as the viscosity the point on this curve corresponding to four minutes.

2. *On Compounded Stock.* The viscosity of the compounded stock, sampled as per item H under H B, 2 C, Milling and Mixing Procedure, given below, shall be determined in the Mooney viscometer with a one-minute warm up at 212° F., using either a large or small rotor. The viscosity shall be the minimum reading of the dial observed between 3 minutes 45 seconds and 4 minutes 15 seconds. When the viscosity is outside the specification limits by one unit or less, viscosity shall then be determined as follows:

Take and record readings of the dial at five-second intervals from three to five minutes. Plot these readings against the time. Draw a smooth curve through the minimum points of each periodic fluctuation. Take as the viscosity the point on this curve corresponding to four minutes.

B. PREPARATION OF VULCANIZATE. 1. *Recipe.*

	Grams	
GR-S (as received)	100.0	400.0
Standard Wyex channel black*	50.0	200.0
B. R. T. #7*	5.0	20.0
Zinc oxide	5.0	20.0
Sulphur†	2.0	8.0
Mercaptobenzothiazole†	1.5	6.0
	163.5	654.0

* This material is specified only for purposes of a standard test formula and is not to be construed as a general endorsement for use in production.

† *Ind. Eng. Chem.*, News Ed., 14, 215 (1936).

2. *Milling Practice.* a. *Weighing of Ingredients.* All ingredients shall be accurately weighed to within 1.0% of the weight specified. The final weight of the mixed batch and the sum of the weights of all ingredients shall not differ by an amount exceeding 1.0% for a compounded batch.

b. *Equipment.* Mixing of the rubber compound shall be done on the slow roll of a laboratory rubber mill with rolls 12-inches in width by six-inch in outside diameter having a working distance between the guides of 10½ inches. The speed of the slow roll shall be 24 rpm., and the gear ratio 1.4, or as near that figure as is compatible with good engineering practice. Sufficient cooling water shall be circulated through the mill rolls to maintain a roll temperature of approximately 70°-100° F. at the start of the mixing and with a maximum of 130° F. during the mixing procedure.

c. *Milling and Mixing Procedure.* All mill openings in the following procedure shall be determined by means of a lead slug. Whenever ¾ cuts are specified, they are to be made by cutting ¾ of the way across the roll and holding until the bank just disappears. When cuts each way are specified, they shall be from alternate directions.

	Operation	Time Allotted (Minutes)
(1)	Pass rubber through rolls twice, without banding, at a mill setting of 0.008-inch ± 0.002-inch.	1
(2)	Band the rubber on the front roll with the mill set at 0.055-inch ± 0.005-inch, and make ¾ cuts every ½ minute from alternate sides.	10
(3)	Add carbon black slowly and evenly across the mill. Open the mill at intervals so as to maintain an approximately constant bank. Make one ¾ cut from each side when one half the black has been added and another ¾ cut from each side when all the black has been added except that which has fallen through the rolls. Then add the black in the pan. Do not change the mill setting or cut the stock with free black on the bank.	12
(4)	Add melted softener which has been kept at a temperature of less than 220° F. for not longer than 30 minutes.	2
(5)	Add zinc oxide, sulphur, and accelerator, taking care to avoid loss.	4
(6)	Cut [illegible] in each way.	2
(7)	Cut the batch from the mill. Set mill at 0.030-inch ± 0.005-inch and pass rolled stock endwise through the mill six times.	2
(8)	Check the batch weight.	0
(9)	Bank stock and sheet out approximately 0.25-inch thick.	1
	Total	34
(10)	Allow stock to rest for at least eight hours.	
(11)	Take viscosity sample.	
(12)	Pass stock through rolls twice, without banding, at a mill setting of 0.008-inch ± 0.002-inch. Band stock, make three ¾ cuts each way, and sheet to a thickness of approximately 0.085-inch. The batch shall be cooled to room temperature on a flat surface and cut into slabs ⅛-inch less in width and length than the corresponding dimensions of the mold cavity. Direction of grain of the rubber shall be marked on each slab. The unvulcanized stock shall be aged at least three hours before curing (Note: It is desirable that aging be in subdued light in air having a relative humidity of 45% at 82° F.)	

3. *Curing.* The test slabs shall be vulcanized in a mold similar to that shown in "A.S.T.M. Standards on Rubber Products"[2] (which gives sheets 6- by 6- by 0.075 inch in dimension) by being heated at 292° F. ± 1° F. for the specified time while held under molding pressure in a hydraulic press. The press shall give a pressure on the mold of not less than 500 psi. The platens shall be of such dimensions that no portion of the slab while curing is nearer than 3 inches to the edge of the platen. In order to avoid cool spots in the platens due to condensed moisture, presses of the bored-platen type are recommended. If platens of the chamber type are used, particular attention must be paid to insuring good drainage by placing the steam outlet slightly below the steam chamber. In either case, the actual platen temperatures shall be verified by means of thermocouples in the mold or other suitable temperature measuring device. The time of cure shall be that between the moment the hydraulic pressure reaches its maximum and the moment of release of the hydraulic pressure. The mold shall be brought to the curing temperature before inserting the uncured stock by being placed in the closed press for a period of not less than 20 minutes. The minimum possible time shall elapse after the stock is placed in the hot mold until the full hydraulic pressure is applied. The slabs shall be removed from the mold immediately after the conclusion of the cure and cooled in water for 10 minutes, after which they shall be wiped dry and reserved for test.

C. TESTING OF VULCANIZATE. 1. *Testing Equipment.* Tensile strength, elongation, and stress-strain tests shall be made on a power-driven apparatus, preferably of the inclination-balance or pendulum type. A spring-balance type of apparatus may be used if provided with a device which will indicate the actual maximum load at which rupture takes place and if provision is made to prevent sudden recoil of the spring. The machine shall fulfill the following requirements.

(a) The applied tension as indicated by a dial or scale shall be accurate within ± 1%.

(b) The indicator shall remain at the point of maximum load after rupture of the test specimen.

(c) The grips which hold the specimen in the testing machine shall be of a type which tightens automatically and exerts a uniform pressure across the gripping surface proportional to the applied tension so as to avoid uneven slipping and to insure failure of the test specimen in its constricted portion.

(d) The rate of travel of the power actuated grip shall be 20 inches per minute and shall be uniform at all times.

(e) Provision shall be made for measuring the elongation by a scale graduated to 0.1-inch which is suitably attached to measuring trammel points or held back of the test specimen.

(f) The testing machine shall be calibrated as described below.

(g) The tension testing machine may be equipped with a dynamometer head of the compensating type for convenience in eliminating calculations.

(h) The testing machine used for a given test specimen shall be of such capacity that the maximum load required to break the specimen should not exceed 85 or be less than 15% of the rated capacity. For tests of most rubber compounds using one of the test specimens described in these methods, a machine of 150-pound maximum capacity will be satisfactory. For general use in tension testing of rubber, possible separation of the grips of at least 30 inches shall be provided.

2. *Calibration of Equipment.* Tension testing machines shall be calibrated by deadweights applied in an ascending order while the machine is otherwise arranged in an entirely similar manner to that used when testing material. In each case, when additional calibrating weight is added, the weight lever of the machine shall be moved to zero position and allowed to swing slowly upward to the point where it will go no farther. The dial of the machine should then clearly indicate the amount of the weight applied.

3. *Preparation of Test Specimens.* Samples and specimens for test shall not be heated, immersed in water, or subjected to any mechanical or chemical treatment prior to test except as specifically prescribed herein. Any such treatment may definitely change the results of test. Particular attention is necessary to avoid previous stretching through inadvertent handling.

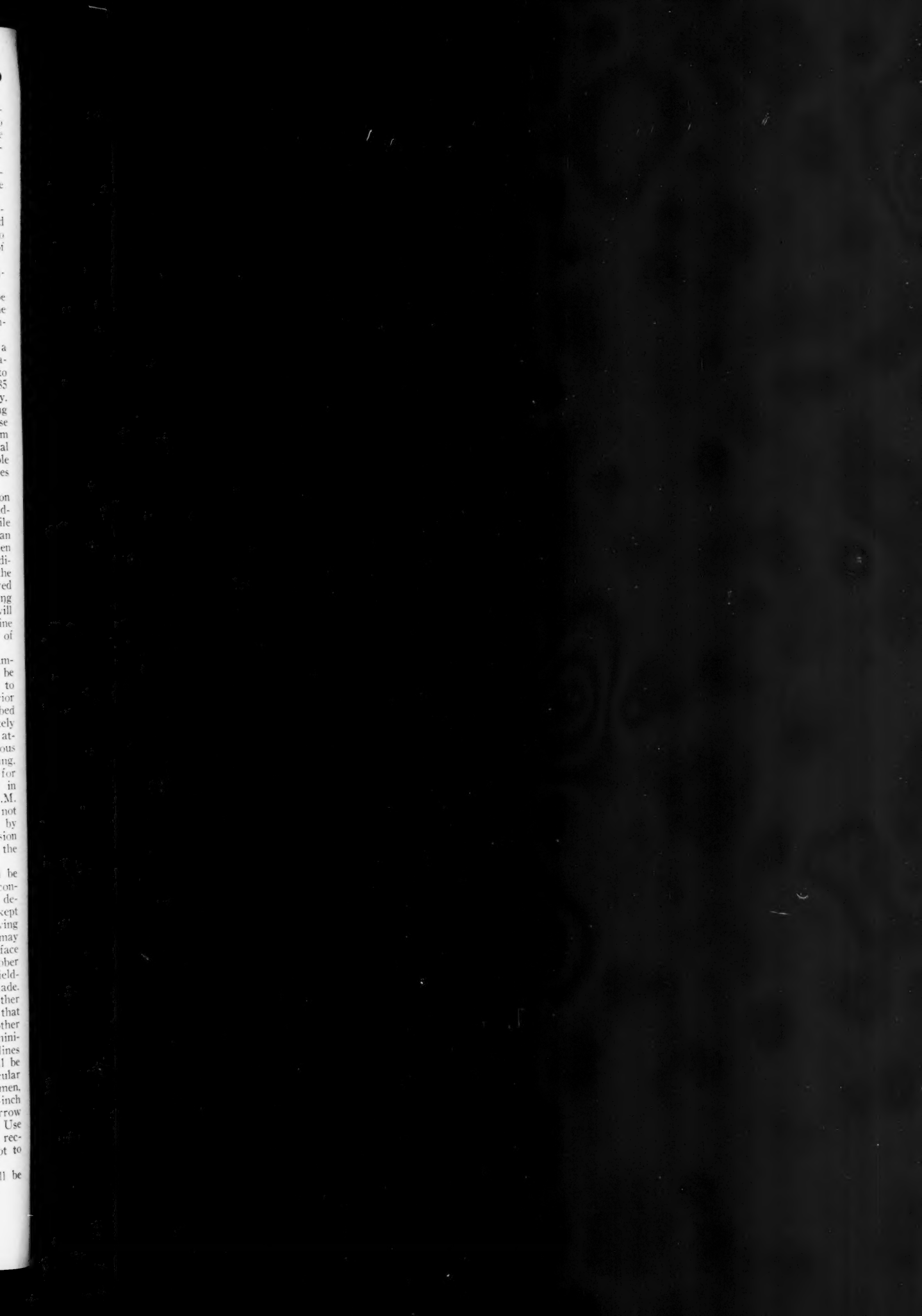
The test specimens shall be prepared for testing with the grain; shall conform in shape to that illustrated in "A.S.T.M. Standard Rubber Products"[3]; and shall not vary in width in the reduced section by more than ± .001-inch from the dimension shown. In no case shall thickness of the test exceed ⅛-inch.

The specimens for tension test shall be stamped out with a steel die suitably constructed to produce the test specimens described heretofore. The dies shall be kept sharp and free from nicks to avoid leaving ragged edges on the rubber. Cutting may be facilitated by wetting the rubber surface and cutting edges of the die. The rubber shall be rested on a smooth, slightly yielding surface which will not injure the blade. Lightweight cardboard or a piece of leather belting is suitable. Care shall be taken that the cut edges are perpendicular to the other surface of the specimen and have a minimum of concavity. Two parallel gage lines for use in determining elongation shall be marked on the reduced section perpendicular to the longitudinal axis of the specimen, one on each side of the center and ½-inch therefrom. The marks shall be as narrow as possible consistent with legibility. Use of a stamp with parallel steel blades is recommended, but care shall be taken not to injure the rubber.

The thickness of the specimen shall be

[2] P. 29 (Feb., 1943).

[3] Die C, p. 37 (Feb., 1943.)



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measured with a micrometer graduated to 0.001-inch, having a presser foot 0.25 ± 0.01-inch in diameter exerting a total force of 3.0 ± 0.1-ounce. The load shall be applied by means of a weight. The minimum thickness and width of the specimen between the gage marks shall be taken in calculating the area used in determining the tensile strength of the specimen.

4. *Tensile Properties.* (a) Tensile strength is the tension load per unit cross-sectional area required to break a test specimen of the type and in the manner herein described. (Note: Since rubber, when so stressed, usually stretches to a high degree with accompanying substantial reduction in cross-sectional area, and since precise measurement of the dimensions at the moment of breaking is not possible, the calculation of intensity of load is referred in all cases to the original cross-section.)

(b) Elongation is the extension produced by a tension load in a section of a test specimen between gage marks placed on it and is expressed as a percentage of the original distance between the marks. Ultimate elongation is the elongation at the moment of rupture. Elongation is also correctly designated by the term "strain."

(c) Tensile stress or "modulus" is the intensity of load referred to the original cross-section at the corresponding stated percentage of elongation which it produces. It is expressed in pounds of tension load per square inch at a specified elongation.

5. *Procedure.* All tests shall be made using specimens which have aged at least eight hours after vulcanization. Tests made more than 60 days after vulcanization shall not be considered as evaluating the original qualities of the material. The specimens shall be conditioned at the test temperature for at least 30 minutes just prior to test.

At least three specimens per sample shall be tested for determinations of tensile strength, elongation, and stress-strain properties. Results on specimens which break outside of the reduced section or which are found to be imperfect shall be discarded, and retests shall be made. In case the ultimate tensile strengths fail to check within 10% of the highest value obtained, additional specimens shall be tested until two or more such check results are obtained. The final values shall be the averages of the check tests, discarding the determinations on samples which are outside of the above limit.

Tensile Strength and Ultimate Elongation. The test specimen shall be placed in the grips of the testing machine, using care to adjust them symmetrically in order that the tension shall be distributed uniformly over the cross-section. The grips shall be separated at the specified rate of speed until rupture takes place, and during separation the distance between the gage marks on the specimen shall be noted continuously so that the instant of rupture the distance is known within 0.1 inch. This value shall be recorded together with the original distance between the gage marks, from which data the ultimate elongation may be calculated. After rupture of the specimen, the breaking load in pounds shall be noted from the dial or scale and recorded together with the original minimum width and thickness of the specimen so that the tensile strength may be calculated.

Stress-Strain Properties. The procedure shall be the same as described above except that the load and extension shall be recorded at equal increments of 100% elongation as well as at rupture. Use of an autographic or spark recorder for registering observed loads is recommended.

6. *Calculations.* Tensile strength shall be calculated by dividing the breaking load in pounds by the original area of the cross-section of the test specimen in square inches and shall be expressed in pounds per square inch.

Elongation shall be calculated by subtracting the original distance between gage marks in inches from the total distance between the marks at the time the stress is measured and expressing this difference as a percentage of the original distance as follows:

$$\text{Elongation, } \% = \frac{D - G}{G} \times 100$$

where:

D = distance between marks at time stress is measured
G = original distance

Ultimate elongation is calculated in the above manner using the distance between marks at rupture for D.

Stress-Strain Properties. Tensile stress or modulus shall be calculated as in the case of tensile strength except that the load observed at the specified elongation shall be used in place of the breaking load.

The specification limits provided are based upon tests made at 82° F. Tests may be made at room temperature between 60° F. and 110° F., provided the results are corrected to 82° F. using the temperature correction factors given in Table 1.

TABLE 1. TEMPERATURE CORRECTION FACTORS

Multiply the values obtained for the tensile properties by the factor corresponding to temperature at which the test was made in order to correct to 82° F.

Temp. ° F.	Tensile Strength	Stress at 300%	Ultimate Elongation
60	.82	.96	.91
61	.83	.96	.92
62	.84	.96	.92
63	.85	.96	.92
64	.86	.96	.93
65	.86	.97	.93
66	.87	.97	.94
67	.88	.97	.94
68	.89	.97	.94
69	.90	.97	.95
70	.90	.98	.95
71	.91	.98	.96
72	.92	.98	.96
73	.93	.98	.96
74	.94	.98	.97
75	.94	.99	.97
76	.95	.99	.98
77	.96	.99	.98
78	.97	.99	.98
79	.98	.99	.99
80	.98	1.00	.99
81	.99	1.00	1.00
82	1.00	1.00	1.00
83	1.01	1.00	1.00
84	1.02	1.00	1.01
85	1.02	1.01	1.01
86	1.03	1.01	1.02
87	1.04	1.01	1.02
88	1.05	1.01	1.02
89	1.06	1.01	1.03
90	1.06	1.02	1.03
91	1.07	1.02	1.04
92	1.08	1.02	1.04
93	1.09	1.02	1.04
94	1.10	1.02	1.05
95	1.10	1.03	1.05
96	1.11	1.03	1.06
97	1.12	1.03	1.06
98	1.13	1.03	1.06
99	1.14	1.03	1.07
100	1.14	1.04	1.07
101	1.15	1.04	1.08
102	1.16	1.04	1.08
103	1.17	1.04	1.08
104	1.18	1.04	1.09
105	1.18	1.05	1.09
106	1.19	1.05	1.10
107	1.20	1.05	1.10
108	1.21	1.05	1.10
109	1.22	1.05	1.11
110	1.22	1.06	1.11

7. *Report.* The reports shall include the following:

(a) The Code number of the GR-S tested. (b) The results corrected to 82° F. calculated as indicated above. (c) The date of test. (d) The temperature of the test room. (e) The type of testing machine used.

This specification is issued by Rubber Reserve Co., Washington 25, D. C., upon the request and with the approval of the Committee on Specifications for Synthetic Rubbers which is giving further study to the specifications and test methods used.

Approved—September 23, 1943
Released—September 27, 1943
Effective October 1, 1943.

Request for Information

MEMORANDUM

TO: Chemical Suppliers
FROM: H. E. Simmons
Office of Rubber Director
SUBJECT: Request for Information on Plasticizers, Tackifiers, Softeners, and Extenders.

This Office is receiving many requests from the industry at the present time relative to the various plasticizers, tackifiers, softeners, and extenders.

We would appreciate it very much, and I am sure we could be of service to you and the industry, if you will supply this office with a complete list of all the plasticizers, tackifiers, softeners and extenders you have produced. It will be helpful if you give some description of each.

December 13, 1943.

Aromatic Petroleum Solvents

MEMORANDUM

TO: Rubber Manufacturers
FROM: H. E. Simmons
Office of Rubber Director
SUBJECT: Aromatic Petroleum Solvents

It is well known that the conventional aliphatic petroleum naphthas used in the manufacture of rubber cements and rubber articles do not have sufficient solvent power to be used satisfacorily for the same purpose with some synthetic rubbers such as neoprene and Buna N. The greater solvent resistance of these two types of synthetic rubber demands the use of aromatic petroleum solvents and/or aromatic solvents. At the present time aromatic petroleum solvents are under allocation as described in Order M-150.

In order to familiarize the rubber manufacturer with the trade names and sources of some of the aromatic petroleum solvents, we are showing below a copy of a memorandum recently received from the Chemicals Division, War Production Board:

"In your recent memorandum, you request a list of the trade names of various aromatic petroleum solvents which may be satisfactory for the production of synthetic rubber (neoprene) cements. Such a list is shown below. The codes under the columns marked 'Availability' are:

GEOGRAPHICAL AVAILABILITY	PRODUCT AVAILABILITY
ES—Eastern Seaboard	1—Only for certain war products.
MW—Middle West	2—Only for war and essential civilian products.
WC—West Coast	3—Not as critical as other products listed.

(Continued on page 384)

EDITORIALS

Reconversion and Rubber Improvement 1944 Problems

FIGURES given in the Rubber Directors' Progress Report No. 4 on the requirements for rubber for 1944 in comparison with consumption during 1943 give strong evidence of the magnitude of the reconversion job required of the rubber industry during the New Year. On a total tonnage basis 80% more rubber will be used for military and essential civilian uses in 1944 than in 1943. The actual figures estimate the use of 757,000 long tons of rubber during 1944 in the U. S. A. as compared with 424,000 long tons used in 1943. Military requirements jump from 268,000 tons to 390,000 tons, an increase of 45%; requirements for truck and bus tires are increased from 81,400 tons to 145,000 tons, a rise of 80%; requirements for passenger-car tires are more than tripled from 42,500 tons to 145,000 tons, a 335% increase; and other indirect military and civilian uses are estimated to be 38,000 tons, as compared with 32,100 tons, an increase of about 19%. The above figures coupled with the statement in this same progress report that the ineffective general manpower situation has made it difficult to man even existing equipment most certainly means that management, labor, and government will need to work together in closest harmony and at maximum efficiency if we are to make the rubber program a complete success by using the large tonnage of synthetic rubber now being provided to manufacture the required large volume of rubber products. It cannot be over-emphasized that the continued success of our war effort and the vitally important problems of the postwar period depend to a very great extent on the solution of this reconversion problem.

It is indeed fortunate that Bernard M. Baruch, who did so much for the rubber industry in organizing the rubber program in 1942, is now actively engaged in formulating reconversion plans for all industry. His recommendations, which are supposed to be made public sometime in January, are expected to contain definite requests for action along the following lines: (1) Give the government the protection it needs against excessive claims by contractors. (2) Give the large percentage of contractors who will be honest in their claims assurance that they will receive advances on their contracts or loans that will enable them to go into peace production in a hurry. (3) Give the returning soldiers the promise that they will not be held out of jobs merely because government agencies and industry were not so efficient in preparing for peace as the soldiers were in winning the war. The rubber industry could well afford to consider present and future plans and policies in the light of the above recommendations.

Along with the physical problems of reconversion, which are fortunately being helped at this time by cutbacks in some types of munition manufacture, thus liberating plants and personnel for the increased 1944 schedule for rubber goods production, are the problems of improving the plants and synthetic rubber which have now recently been provided to replace the natural rubber supply lost to the Japanese. R. P. Dinsmore, Goodyear Tire & Rubber Co. vice president in charge of research and development, in a recent statement after hailing the synthetic rubber plant construction program as "a modern miracle" pointed out that now we are entering on another just-as-difficult phase, the perfection of the plants' products to permit greater improvement of articles already using synthetic rubber, and conversion to synthetic from natural rubber, as quickly and feasibly as possible, of many articles still being made with the latter. Dr. Dinsmore admitted that the synthetic rubber plants erected for the war emergency are far from the last word. Speed and standardization were the prime considerations in erecting these plants, it was said, but certainly they are susceptible to technological improvements. Fortunately, however, all these plants were designed purposely to be flexible, he added. Dr. Dinsmore suggested that during 1944 both private and government planning give first preference to rubber improvement and secondary attention to economics in plant process. Upon this decision rests the question of whether the splendid job already done shall be made effective or of doubtful value. As far as rubber is concerned, whether viewed from a patriotic or a selfish competitive standpoint, no disaster could exceed the failure to solve this problem and no other success could outweigh its solution, he concluded.

There is very little that can be added to the above statements except to mention that they parallel some of the views expressed in this column in the recent past and to repeat again the suggestion that during the year 1944 is the time for industry and government to reach an agreement for financing research on synthetic rubber so that these problems both now and in the future can be most efficiently and completely solved. Technological improvements have been achieved at a greatly increased rate during the last two years in the rubber industry, but by contrast achievements in fundamental research have to a considerable extent been retarded. It is not unlikely that further improvement in synthetic rubber production processes and the quality of the rubber produced may be dependent on the results of a long-term program of fundamental research more than anything else. Unless such a program is agreed upon and actually set in motion during the year by industry and government, the opportunity may not present itself again during the next decade. Industry, government, and the public will then all be the losers.

Another problem in rubber improvement which has made exceptional progress during the last two years and which progress and results may be wasted unless industry and government do something to see that the work is continued, is the problem of new methods of growing, extracting, and processing guayule rubber. The work of the Department of Agriculture Forest Service, as reported in this and future issues of INDIA RUBBER WORLD, has made an excellent start toward obtaining a real improvement in this type rubber. Recent Congressional action denied funds for expansion of this project. Research and development work will of necessity be restricted.

What the Rubber Chemists Are Doing

A. S. M. E. Rubber and Plastics Group Meets

A FEATURE of the annual meeting of the Rubber and Plastics Group of the American Society of Mechanical Engineers, which was held at the Hotel Pennsylvania in New York, N. Y., December 1 and 2, as a part of the annual meeting of the parent society, was the joint session with the Aviation Division. There were three sessions therefore: the aviation-rubber and plastics session on December 1, the plastics session in the morning of December 2, and the rubber session that afternoon.

The first paper given before the meeting on rubber was by J. G. Kreyer, of Firestone Tire & Rubber Co., on "Inflatable Lifesaving Rafts in the War Effort." Generously illustrated with slides, this paper gave a very comprehensive description of the manufacture of the various sizes of these rafts which have been used so extensively by the Army and Navy Air Forces during the present war. It was explained that the development of the inflatable raft was directly connected with development of free balloons, and at the time of greatest interest in this latter development work on the life rafts began since construction details were somewhat similar. It was emphasized that the usefulness of these rafts lies in lightness, compactness, mobility, durability, and reliability. The design for the Army or the Navy is essentially the same, and the rafts are made one-, two-, four-, five-, and seven-man sizes. A table of comparison of dimensions and weights of the rafts was given. The special types of cotton fabrics used for outer and inner plies and the general methods of their use were described. It was explained that up to recently natural rubber had been used almost completely in the coating operation, and although conversion to synthetic rubber was under way, it would be delayed until service tests on the rafts in the packed condition were completed and until a suitable orange-yellow dye which would not fade, when used with synthetic rubber, was found. Of considerable interest was the description of the seaming operations and water and air-holding tests made on the finished rafts. After a discussion of the refinements in the way of the use of carbon dioxide gas for inflation, and oars, sails, repair kits, fishing equipment, and other accessory equipment now included with these rafts, the speaker ended with some information on a new 25-man raft and the possible value of this type of lifesaving equipment for post-war use.

The second paper before this session, presented by James H. Booth, of Thompson Products, Inc., was entitled "Use of Rubber in Power Drive Lines." It was stated that the use of a rubber coupling in power drive lines permits wide ranges of torsional flexibility, assists in breaking up torsional vibration periods and keeps power losses at a minimum. Although there are many methods of applying rubber in power drive lines, the discussion in this paper was confined to the limitations of a design composed of rubber blocks in a housing, using rubber in compression for the driving torque. The coupling described was designed and patented by F. M. Guy and is for use on all types of vehicles and equipment where power is transmitted to the drive wheels, such as cars, trucks, street cars, etc.; it is known as the "Thompson Coupling." It was explained that the two English racing cars designed for the maximum speed record: namely, the "Railton-Cobb" and the "Thunderbolt," were equipped with this type of coupling in the power drive line. Details of its construction were given, including the means by which a rubber to metal bond of approximately 1,500 p.s.i. was obtained. The importance of rubber hardness to the flexibility of the coupling was described, and a chart showing the difference in deflection of two hardnesses of rubber was shown. Another chart revealed the angular deflection between various sizes of couplings of one rubber hardness, and the sensitivity to the deflection angle to the diameter of the coupling and the block cross-sectional dimensions. Angular deflection of the coupling results in energy being consumed as the rubber is deflected, but this energy is transmitted back almost completely as the rubber returns to its normal position, it was stated. The formulae used for the selection of the correct rubber couplings for passenger cars were given. There is a promising future for the use of rubber in the power drive lines of postwar vehicles, the speaker stated, since there is a tendency of passenger-car designers to increase the stiffness of the body and frame in order to build lightweight cars for high performance. The increasing noise level in these cars may be reduced by the use of rubber in the drive lines.

The next paper, by John W. Liska of Firestone, was the annual review on "Advances in Rubber during 1943", which emphasized the achievement of the virtual completion of the synthetic rubber production program. The complete paper will be found on pages 371-74 of this issue.

Gordon M. Kline, of the National Bureau of Standards, and chairman of the Rubber and Plastics Group, presented the annual review on "Advances in Plastics during 1943." This paper gave first a brief survey of the new materials reported during the year and then described advances in molding and fabricating techniques in the plastics industry, such as low-pressure laminating, post-forming of laminates, and heatronic molding, which have become new tools in the production of plastic parts for our Armed Forces. The many new applications of plastics during 1943, particularly those in the aircraft field, were reported, and then activities in connection with properties, testing, and specifications were described. The complete paper will appear in our February issue.

Joint Session with Aviation Division

The first paper given before the joint session with the Aviation Division was by Charles F. Marschner, of McDonnell Aircraft Corp., and was entitled "Current Applications and Future Possibilities of Paper Base Laminates in Aircraft." It was stated that little work had been done on high-strength materials of this sort until about five years ago, but the use of high-strength paper-base plastic materials on production combat aircraft has resulted in part from the plastics development program of the McDonnell Corporation with the help of the Forest Products Laboratory at Madison, Wis., and the encouragement of the Army Air Forces personnel at Wright Field. Phenolics were indicated as the best bonding agents, and fibre resins ratios of 2:1 or 3:1 were found to give the maximum strength. Molding pressures of 250 p.s.i. permit the use of lightly constructed presses. Paper-base plastic ammunition boxes, seats, gun covers, and many other items were exhibited. Postwar uses in housing, automobiles, and air conditioning units were considered possible.

The second paper, by William W. White, of Douglas Aircraft, on "Plastic Tubings and Fittings" described the work of the National Aircraft Service Committee in standardizing these materials for war production use. The lower cost and weight of the plastic fittings and the advantages of the smooth internal passages for aircraft applications were stressed. With the tubing a 25% cost saving over metals is realized and about a 5% saving in weight. Possible postwar civilian uses were mentioned.

The last paper at this session, by H. Dietz, of the Massachusetts Institute of Technology, was entitled "Behavior of Synthetic Urea Resin Assembly Adhesive under Alternating Stresses" and described work done with urea-formaldehyde bonded wood laminates under vibration to determine limits of strength after flexing. Of interest was the statement that on samples not carried to failure, no detectable loss of stiffness after flexing could be found.

Plastics Session

"Creep Properties of Molded Phenolic Plastics" was the subject of a paper by David Telfair, T. S. Carswell, and H. K. Nelson, of Monsanto Chemical Co. Results on the determination of total creep of cord filled, rag filled, and wood flour filled as well as mica and asbestos filled phenolic resin compounds were given. The work was carried out both at room and elevated temperatures and also included a calculation of creep rates as well as total creep.

A very interesting development that was accelerated by wartime demands was described by W. R. McLain, of Huntsville, Ala., in "Plastic Printing Plates." One of the outstanding developments of the day is the introduction of plastic molds and printing plates to the graphic arts field, it was stated. The plates are the result of extensive research and have already proved their ability to perform equally as well as the electrotypes and stereotypes now in use. A usual run of from 200,000 to 250,000 impressions from a single plate was reported. The demand for greater simplicity and speed in the manufacture of printing plates, coupled with the need of economy in domestic and international interchange of plates by air travel, opens a great field for plastic plates, and the producers are ready to supply these in larger quantities and of better material in the postwar period, it was said in conclusion.

"Antiscatter Treatments for Glass" was the subject of the last paper at this session, given by Frank W. Reinhart, Ruth Krondstadt, and Dr. Kline, of the National Bureau of Standards. By means of a vacuum concussion apparatus the value of many lacquers and plastic sheetings as well as tapes for the prevention of scattering of glass window panes during possible bombing raids was investigated. The results showed that a thickness of film on the glass of at least 12 millimeters was necessary and that polyvinyl butyral films gave the best results.

Chemical Engineering Award Dinner to American Synthetic Rubber Industry

TWO thousand persons representing those rubber, chemical, petroleum, and allied companies responsible for the design, construction, and operation of our new American Synthetic Rubber Industry were present in the grand ballroom of the Waldorf-Astoria Hotel, New York, N. Y., December 8 for the presentation of the 1943 Award for Chemical Engineering Achievement to some 65 of these companies for their contribution in making this new industry possible.

In his opening remarks, Sidney D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering*, secretary of the committee of award, and the toastmaster for the dinner, reviewed the history of the Chemical Engineering Award, which was first made in 1933 to the Carbide & Carbon Chemicals Corp. for the development of a great synthetic organic chemical industry based on the hydrocarbons of petroleum and natural gas. The other recipients of the award were E. I. du Pont de Nemours & Co., Inc., in 1935 for the successful production of neoprene; Monsanto Chemical Company in 1937 for the large scale production of elemental phosphorus; Standard Oil Development Co. in 1939 for the development of new aviation fuels and certain synthetic chemical products from petroleum; and Dow Chemical Co. in 1941 for the recovery from sea water of magnesium metal.

In his presentation of the Award, Prof. Alfred H. White, of the University of Michigan, and chairman of the award committee, mentioned the difference in conditions between 1913, when at the International Congress of Applied Chemistry in New York, the German achievement of building a synthetic ammonia plant was hailed, while in 1943 the American miracle of building almost overnight an enormous synthetic rubber industry was the cause for celebration. American energy and effort were cited as the cause of this rapid progress, and Professor White reminded the audience of the risk that the companies and individuals had taken in staking their reputations in the synthetic rubber production effort. Mr. Kirkpatrick then read the names of the companies being honored for making this country independent of any foreign source of rubber and stated that "America has now won her rubber independence."

Dewey Sees 12¢ Bunas Possib'e

In his address of acceptance on behalf of the synthetic rubber program, Rubber Director Bradley Dewey spoke on the "Postwar Future of Synthetic Rubber." In his opening remarks he paid tribute to the Baruch Committee, former Rubber Director William M. Jeffers, Secretary of Commerce Jesse Jones, and E. R. Weidlein and his associates in the Rubber Reserve Co., as well as to all the men and women in the industry for their accomplishment. The war effort demands that the quality of Buna S be improved, and Colonel Dewey said that the technical men of the industry are dedicated to this purpose and they will not fail. While the main effort has been and still is for the war, the Rubber Director stated that he felt that many who had contributed so much could not help but hope that they were playing a part in the start of another industry, and for this reason he wanted to discuss the future of synthetic rubber.

The government synthetic plants to date have produced 140,000 long tons of synthetic rubber and were scheduled to produce 45,000 long tons during December. More than 700,000 long tons will be produced in 1944, with a capacity at the end of the year of 850,000 long tons. We must never again get caught without rubber, and the actual situation as to postwar supply and price levels of natural rubber, rather than economic philosophy, will ultimately determine the future, he said. Neoprene, Buna N, and Butyl have qualities inherent in each which will insure their survival, while the magnitude of the postwar market for each will be determined by what the public will pay for their special qualities. In the case of Buna S, which represents 80% of the present program, the very diversification entailed in spreading the initial risk by selecting and developing a number of processes means that the units with high processing costs cannot hope to compete after the war. The question of what should be done with the low cost producers will be an entirely different one, the Rubber Director said, and pointed out that they would have to compete with natural rubber at a price of 10¢ a pound. Buna S has been made at a cost before depreciation of less than 14¢ a pound. On the same basis, a price of 7¢ a pound for butadiene and 12¢ a pound for styrene would seem justified according to present-day knowledge and experience, and this should result in a cost for Buna S after the war of about 12¢ a pound. Depreciation for these plants running at capacity will be about 1.05¢ per pound, but since we have the plants paid for as a cost of war and they are of no going value unless used, why consider even this small depreciation charge, it was pointed out.

Another factor that will probably play a great part in the postwar picture is the industrial renaissance which has already come to pass in Russia and which is coming in China, India, and many sections of Africa, the Far East, and other parts of the world, and will demand tremendous additional tonnages of rubber. If the net result of the competition between synthetics and crudes is a price of 16¢ or below, many new uses and new outlets for rubber may be developed. Come what may, the synthetic rubber program has already served notice that prices of 16¢ a pound for crude rubber in the United States of America will mean plenty of competition from synthetics, the Rubber Director stated in conclusion.

Jeffers Asks Fair Treatment for Industry

Mr. Jeffers added his tribute to those of the other speakers for the job that had been done by industry in providing synthetic rubber, but emphasized the fact that there was still a long way to go. Much improvement in the quality of synthetic rubber was still needed, but both now and in the future we are no longer dependent on any foreign country for our rubber supply. The American people want tires, he declared, and we need to develop a synthetic rubber or rubbers that will answer all our purposes. The achievements of American industry during the present war have received international recognition, and their contribution could continue to be just as great after the war if industry were given a fair chance. The speaker asked that taxation not be excessive in order that industry could deal adequately with the problem of reconversion and said that it was indeed fortunate that men like Bernard M. Baruch and Jesse Jones were still active in Washington to help guide government policies during the months ahead. Repeating his faith in the common man, he said in conclusion that it was his belief that:

"No government, no people, no era is smarter than Main Street."

Mr. Baruch was unable to be present, but Howard J. Klossner, president of the Rubber Reserve Co., and Stanley T. Crossland, vice president, were introduced. Mr. Crossland spoke briefly of the function of the Rubber Reserve Co. in the rubber program. Dr. Weidlein, who is also director of the Mellon Institute of Industrial Research, likewise was introduced to the audience.

Campbe'l Describes Army Ordnance Prob'em

"Synthetic Rubber in the War Effort" was the subject of the talk by Major General L. H. Campbell, Jr., Chief of Ordnance, U.S.A. He described the reasons for the formation of the Rubber Products Ordnance Advisory Sub-Committee in 1937, which became the central source of contact between Army Ordnance and the rubber industry. As the rubber problems became more numerous and varied, in 1942 other special committees of specialists on pneumatic tires, bogie rollers, half tracks, tank track engineering, and bullet-sealing tanks were formed, and other specialist groups worked with the mechanical goods division of the Rubber Manufacturers Association, Inc. Major General Campbell then described the work of the ordnance proving grounds and stated that three of these test centers averaged 43,150 vehicle miles a day every day. He reviewed the progress in the conversion of small- and large-size tires to synthetic rubber and stated that mechanical goods conversion was 80% complete. The overall conversion of the ordnance department was more than 50% complete, he said. In conclusion he paid tribute to the members of the American Synthetic Rubber Industry, who, he said, have had a vital part in the winning of the war.

A. C. S. Activities

Rubber Division Spring Meeting

IT HAS been decided by the officers and the executive committee of the Division of Rubber Chemistry, A. C. S., that in view of the continuing problems of transportation and hotel accommodations, to hold this Division's part of the spring meeting of the American Chemical Society again in New York, N. Y., April 26, 27, and 28. The Hotel Commodore has been selected for the Rubber Division meeting, and the main ballroom, ballroom floor foyer, and Parlor A have been reserved for the entire period. The banquet is scheduled for the evening of April 27. An opportunity for pre-registration will be provided. Hotel room reservations for attending members and guests must be made directly with the hotel by everyone planning to attend this meeting, and guaranteed hotel reservation cards will be mailed to all members of the Division as well as registration reservations in the near future. It is requested that members begin to make definite plans now for the presentation of papers or to attend this meeting, which should afford an excellent opportunity for the discussion

of problems and progress of wartime rubber chemistry and technology.

Harry E. Outcault is chairman of the local committee on arrangements. Other members of this committee are Walter J. Geldard, Simon Collier, Fred S. Conover, R. G. Seaman, Joseph Breckley, M. F. Davis, E. S. Kern, I. E. Lightbown, P. P. Pinto, and B. B. Wilson.

New York Group Festivities

THE annual Christmas party of the New York Group, Division of Rubber Chemistry, A. C. S., was held at the Building Trades Club, 2 Park Ave., New York, N. Y., December 17, with an attendance exceeding 450, taxing the wartime facilities of the club to the point where more than 50 members and guests had their dinners at the neighboring Hotel Vanderbilt.

After the dinner proper there was a short business meeting at which the nominating committee, consisting of J. de C. Van Etten, chairman; Kenneth B. Cary and Simon Collier, presented the following slate for next year: chairman, F. S. Conover, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.; vice chairman, H. E. Outcault, St. Joseph Lead Co., New York; sergeant-at-arms, Ervin S. Kern, R. T. Vanderbilt Co., and secretary-treasurer, Peter P. Pinto, *Rubber Age*, New York; executive committee, three-year term, Harry L. Fisher, U. S. Industrial Chemicals, Inc., Stamford, Conn.; S. M. Martin, Jr., Thiokol Corp., Trenton, N. J., and Harry Frecker, U. S. Rubber, Passaic, N. J., ex-officio members, John H. Ingmanson, Whitney Blake Co., Hamden, Conn., and B. B. Wilson, INDIA RUBBER WORLD.

There was entertainment during and following the dinner, and the drawing for more than 200 prizes made possible by the generosity of the following:

Advance Solvents & Chemical Corp.; Akron Standard Mold Co.; L. Albert & Son; American Cyanamid & Chemical Corp.; American Zinc Sales Co.; Anaconda Sales Co. (Pigment Division); J. T. Baker Chemical Co.; The Barrett Division, Allied Chemical & Dye Corp.; Binney & Smith Co.; Godfrey L. Cabot, Inc.; Callaway Mills; Carter Bell Mfg. Co.; Cleveland Liner & Mfg. Co.; The Container Co.; Continental Carbon Co.; E. I. du Pont de Nemours & Co., Inc. (Rubber Chemicals Division); Flintkote Co.; General Atlas Carbon Division of General Properties Co., Inc.; Givaudan-Delawanna, Inc.; The C. P. Hall Co.; J. M. Huber, Inc.; D. E. Henderson (Hycar Chemical Co.); R. C. Bascom (Hycar Chemical Co.); INDIA RUBBER WORLD; I. B. Kleinert Rubber Co.; The Loewenthal Co.; Midwest Rubber Reclaiming Co.; Monsanto Chemical Co. (Rubber Service Department); Moore & Munger; H. Muehlstein & Co., Inc.; National Rubber Machinery Co.; National Sherardizing & Machine Co.; Naugatuck Chemical Division of United States Rubber Co.; New Jersey Zinc Co.; Pequanoc Rubber Co.; The Philadelphia Rubber Works Co.; Pittsburgh Plate Glass Co. (Columbia Chemical Division); Rare Metal Products Co.; Revertex Corp. of America; *The Rubber Age*; St. Joseph Lead Co.; A. Schrader's Son; A. Schulman, Inc.; Henry L. Scott Co.; Southeastern Clay Co.; Speed Products Co.; Stamford Rubber Supply Co.; Stanco Distributors, Inc.; Standard Chemical Co.; Stauffer Chemical Co.; Sun Oil Co.; C. J. Tagliabue Mfg. Co.; Textile Proofers, Inc.; Thiokol Corp.; Thompson, Weinman & Co., Inc.; Wm. R. Thropp & Sons Co.; Titanium Pigment Corp.; United Carbon Co.; U. S. Rubber Reclaiming Co.; R. T. Vanderbilt Co., Inc.; Vansul, Inc.; C. K. Williams & Co.; Wilmington Chemical Corp.; Wishnick-Tumpeer, Inc.; Xylos Rubber Co.

L. A. Group December Meeting

THE December meeting of the Los Angeles Rubber Group was held at the Pasadena Play House, Pasadena, Calif., and included the performance of "Dark Eyes." This meeting was in the nature of a Christmas Party, and aside from the announcement of the officers and directors for next year, the only real business was the prize drawing and the award of an honorary membership to Edward L. Royal.

The board of directors for 1943 presented retiring chairman Charles J. Roese with a cigar humidor, and a gift was given his secretary who handled a great many of the details for the Christmas party. The new board and officers for 1944 will consist of chairman, A. L. Pickard, Braun Corp.; associate chairman, R. E. Hutchinson, Firestone Tire & Rubber Co.; vice chairman, C. M. Reinke, Reinke-Hillier & Amende; secretary, Walter E. Boswell, Thiokol Corp.; treasurer, Curtis R. Wolter, United States Rubber Co.; and directors, Edward L. Royal, H. M. Royal, Inc., Phillip Drew, Goodyear Tire & Rubber Co., Wm. F. Vonder Reith, Sierra Rubber Co., and Charles J. Roese, Goodyear.

The following persons were the winners of prizes, such as traveling cases, billfolds, umbrellas, etc.: Charles Lamb, Jr., Fred Hiller, Mrs. Norton, Ed Gray, Mr. Baldwin, Mrs. McCormick, and Miss Anderson. War Stamps were won by Mrs. Guyette, Ludwig Mueser, James Harrison, Miss Gonzalez, Ed. Royal, Mr. Diehl, Miss Betty Johnson, James Gimian, Frank Sport, and Mrs. Francis Keefe.

Buffalo Group Party

THE Buffalo Rubber Group Christmas party was held at the Westbrook Hotel in Buffalo on December 16 with 109 members and guests in attendance. The entire evening was given over to dinner, entertainment, and the drawing for prizes. The large selection of gifts were made possible by contributions received from various suppliers of materials to the rubber industry.

A report of the retiring secretary-treasurer was presented and accepted, and the new officers for the 1944 season were elected. These are chairman, G. W. Cassell, General Cable Co.; vice chairman, G. Van Nimwegen, Carborundum Co.; and secretary-treasurer, H. J. Deney, of Pierce & Stevens.

Chairman, New York Group

Fred S. Conover, new chairman of the New York Group, Division of Rubber Chemistry, American Chemical Society, has had a long career to his credit though he can't really be called a veteran (he was born January 2, 1900, in Trenton, N. J.). He is a graduate of Colgate University, where he received his B.S. in 1922. The Dexter Rubber Co., Goshen, N. Y., initiated him into the rubber field in 1922, but after a year he switched to Republic Rubber Co., Youngstown, O. In 1925 he joined the New Jersey Zinc Co., Palmerton, Pa., and five years later went to the Manhattan Rubber Co., Passaic, N. J. Following a four-year stay with Manhattan Rubber, Mr. Conover left for Rubatex Products, Inc., Bedford, Va., and about a year later went with the Naugatuck Chemical Division of the United States Rubber Co. At present he is in charge of research and development of latex and dispersions at Naugatuck, Conn.

Alexander Studio

Fred S. Conover

Mr. Conover plays vital roles in extra-curricular rubber activity as well. He is chairman of the technical committee, Rubber Reclaimers Association, and was manager of the Reclaim and Scrap Rubber Division of the WPB from June-September, 1943. He is a member of the American Chemical Society and, of course, of the New York Group, of which he was vice chairman last year. In addition he has presented some papers of interest to the rubber industry. He is also an enthusiastic hunter and fisherman.

Mr. Conover resides at 243 Park Ave., Naugatuck, Conn. He is married and has three children.

Boston Group Winter Meeting

THE Boston Rubber Group held its winter meeting at the Hotel Statler in Boston, Mass., Friday evening, December 10. A talk on "Polysulphide Rubbers" was given by J. M. Crosby, of the Thiokol Corp., and after the annual election of officers an exhibition of mind reading was given by Mr. Jerrauld. Music during the dinner was furnished by a trio of young women musicians.

Mr. Crosby in his talk reviewed the development of "Thiokols," starting with the original "Thiokol" A and then mentioning B, D, DX, F, and then FA, which is one of the currently used major types. "Thiokol" RD, which is not a polysulphide rubber, but a butadiene copolymer, was also mentioned, and the production activity in connection with "Thiokol" N during the past year or more, but which now has been curtailed, was explained. The special properties of the new "Thiokol" ST as compared to other oil-resistant synthetic rubbers were described in some detail.

Officers of the Boston Rubber Group for the year 1944 follow: chairman, J. L. Haas, Hodgman Rubber Co.; vice chairman, Harry A. Atwater, Hood Rubber Co.; and secretary-treasurer, J. P. Geenty, Reading Rubber Co.; executive committee, T. M. Knowland, Boston Woven Hose & Rubber Co., and David R. Cutler, Alfred Hale Rubber Co.

An auditing committee appointed to check the financial statement consisted of A. A. Glidden, Hood Rubber; H. P. Fuller, Pequanoc Rubber Co.; and Jesse H. Mason, Haartz-Mason-Grower Co.

Detroit Group Session

THE Detroit Rubber & Plastics Group, Inc., held its Christmas meeting and dinner December 15 at the Detroit-Leland Hotel, Detroit, Mich. About 150 members and guests heard H. G. Moock, of the Chrysler Corp., talk on "Some Viewpoints

of Leadership" and watched Walter Grote, of United Carbon Co., perform a few of his expert card manipulations. As a concluding feature, prizes contributed by various manufacturers serving the rubber and plastics industries were distributed to about 25 fortunate members of the audience.

In his talk Mr. Moock emphasized particularly that regardless of their job titles, all his listeners were in fact salesmen, with the sales job of transferring ideas from their own minds to other minds. He stressed the point that the success of the transfer was conditioned on due consideration being given to the individual viewpoints, prejudices, and capacities of the man who must receive the idea.

A report was made by C. W. Selheimer on the progress of the Rubber and Plastics Laboratory at Wayne University in Detroit. Equipment of this laboratory has been a major interest of the Detroit Rubber & Plastics Group, and Professor Selheimer's report of equipment or cash received up to a value of $16,000 represents about one-third accomplishment of the goal set two years ago. The equipment has been housed in the Department of Chemical Engineering, and in February the course in the chemistry of rubber and plastics will become part of the regular chemical engineering curriculum.

Contributions from the following concerns made the prizes possible: Baldwin Rubber Co.; Barrett Division of Allied Chemical & Dye Corp.; Binney & Smith Co.; Godfrey L. Cabot, Inc.; Continental Carbon Co.; E. I. du Pont de Nemours & Co., Inc.; Firestone Tire & Rubber Co.; General Tire & Rubber Co.; Herron Bros. & Meyer; Hycar Chemical Co.; Industrial Rubber Goods Co.; Midwest Rubber Reclaiming Co.; Minnesota Mining & Mfg. Co.; Monsanto Chemical Co.; H. Muehlstein & Co., Inc.; Naugatuck Chemical Division of United States Rubber Co.; New Jersey Zinc Co.; Pequanoc Rubber Co.; Philadelphia Rubber Works Co.; Pigua Stone Products Co.; A. Schulman, Inc.; Stanco Distributors, Inc.; Standard Chemical Co.; Thiokol Corp.; U. S. Rubber Reclaiming Co.; R. T. Vanderbilt Co., Inc.; Wishnick-Tumpeer, Inc.; Xylos Rubber Co.

Northern California Group

A MEETING of the Northern California Rubber Group was held December 2 in the Hotel Claremont, Berkeley, Calif. There was no formal speaker, and the evening was devoted mostly to a discussion of technical matters in connection with the use of government synthetic rubbers. Some of the problems presented and discussed were the moisture content of GR-S, the stability of GR-M, the effects of using RPA No. 5 in GR-S compounding, and the conversion of certain items of rubber machinery to GR-S production.

Nominations were made for the officers for 1944 to be voted on before the first of the year. George Petelin was made chairman of the Christmas Party committee, and at the close of the meeting a drawing was held for a brief case donated by Binney & Smith through the Martin, Hoyt & Milne Co. It was won by Leonard Boller, of the Pioneer Rubber Mills.

Montreal Section Hears Mark

A MEETING of the Society of Chemical Industry was held under the auspices of the Rubber and Plastics Division, S. C. I., on December 15 in the ballroom of the Ritz-Carlton Hotel, Montreal, P. Q., Canada. The meeting was preceded by a dinner at which a number of students of McGill University attended as guests of the British Rubber Co.

The speaker for the evening was H. Mark, of Brooklyn Polytechnic Institute, Brooklyn, N. Y., who dealt with "Some Scientific Aspects of the Synthetic Rubber Problem." Dr. Mark discussed structural features which seem to be important for the thermal and mechanical behavior of high polymers including: (1) The average degree of polymerization which, it was stated, can best be determined by osmotic or ultracentrifuge measurements or by light scattering. (2) The distribution curve of molecular size. This function can be obtained by fractionating the polymer under consideration and by investigation of its fractions. All natural and synthetic polymers show more or less wide distribution curves, and, in general, natural products, such as cellulose or its derivatives, exhibit somewhat sharper distribution curves than synthetic polymers or copolymers, such as vinyl derivatives or vinylbutadiene combinations. (3) Intermolecular forces between the chain molecules. These depend upon the chemical nature of the monomer or monomers and upon their arrangement in the chains. The total average mutual attraction between the chain molecules, as well as the existence of very strong local bonds (so-called cross linkages) are of importance. Strong overall mutual attraction through hydrogen bridges or strong polar forces leads to typical fibers such as nylon, cellulose, cellulose esters, etc.; while moderate overall attraction between the chain molecules leads to plastic materials, which at sufficiently high temperature exhibit viscous flow and at low temperatures below the brittle point show the characteristics of glass, i.e., polystyrene, polyvinyl chloride, acetate copolymers and polyacrylesters. Weak overall attractions, together with strictly localized strong cross-links, lead to typical rubbers. Such materials are amorphous or disordered in the unstretched state, but show definite crystallization under the influence of an external stress. Above a certain temperature (transition point), however, the crystallized areas are only stable in the presence of a certain external force. As soon as this force ceases to act, the crystals melt and the material contracts; it shows rubber elasticity. (4) The internal flexibility of the chain molecules. This depends also upon the chemical nature of the material, particularly upon whether there are any double or triple bonds left in the chains, the number and size of substituents which are attached to the main chain, and whether the chains are mainly straight or have a certain degree of branching. It was stated that high internal flexibility produces quick response to external forces; while reduced molecular flexibility makes the material slow in respect to its response, and produces the phenomenon of creep growth.

Aromatic Petroleum Solvents

(Continued from page 379)

Name	Distributer	Availability: Geographical	Availability: Product
Solvents Containing Some Benzol			
Apcosol #1	D. H. Litter, New York, N. Y.	ES	3
Aromatic #1	Wm. J. Hough Co., Chicago, Ill.	MW	3
Arosol #10	American Oil Supply, Newark, N. J.	ES	3
Velsicol #1	Velsicol Corp., Chicago.	MW	3
Solvents in the Toluol Range			
Amsco A	American Mineral Spirits Co., New York	ES-MW	1
Amsco C	Ohio Mineral Spirits Co., Cleveland, O.	ES-MW	1
Enn Jay #1	Stanco Distributors, Inc., New York	MW	1
	Wm. J. Hough Co.	MW	1
	Western Rosin & Turpentine Co., Detroit, Mich.	MW	1
	Wisconsin Mineral Spirits Co., Milwaukee, Wis.	MW	1
	Dill-Hough Co., St. Louis, Mo.	MW	1
	Various Standard Oil Companies	ES-MW	1
Solvasol #73	Socony-Vacuum Oil Co., New York	ES	1
Solvesso #1	Standard Oil Co. of N. J., New York	ES-MW	1
Solvsol 19-27	Assoc. Tidewater Oil Co., Los Angeles, Calif.	WC	2
Solvsol 38-48	Assoc. Tidewater Oil Co.,	WC	2
TS-11	Shell Oil Co., California	WC	2
Union Solvent #8	Union Oil Corp., Richmond, Calif.	WC	2
	Wm. S. Gray Co., New York	ES	1
Alternate Solvent			
Amsco AX	American Mineral Spirits Co.	ES-MW	2
Enn Jay 1X	Wm. J. Hough Co.	MW	2
Solvents in the Xylol Range			
Amsco B	American Mineral Spirits Co.	ES	2
Amsco B	Ohio Mineral Spirits Co.	MW	2
Apcosol #3	D. H. Litter Co.	ES	3
Arosol #11	American Oil Supply Co.	ES	3
Enn Jay #2	See Enn Jay #1 above	MW	2
HN #2	See Enn Jay #1 above	MW	2
Hydro-Naphtha	Wm. S. Gray Co.	ES	3
Solvasol #74	Socony-Vacuum Oil Co.	ES	2
Solvesso #2	Standard Oil Co. of N. J.	ES	2
Solvsol 24-34	Assoc. Tidewater Oil Co.	WC	2
Solvsol 27-37	(50%) Assoc. Tidewater Oil Co.	WC	2
TS #16	Shell Oil Co.	WC	2
Union Solvent #30	Union Oil Corp.	WC	2
Union Solvent #30	Wm. S. Gray Co.	ES	2
Velsicol #2	Velsicol Corp.	MW	2
Velsicol #3	Velsicol Corp.	MW	3
Alternate Solvents			
Solvesso Xylol (War Grade)	Standard Oil Co.	ES	2
	Other Standard Oil Companies	MW	2
	Stanco Distributors, Inc.	MW	2

"All the products listed above are under allocation according to Order M-150. The indication of product availability will change from time to time.

"It is suggested that rubber manufacturers be prepared to change from one solvent (or blend) to another in order to accommodate themselves to the changing availability of any given solvent. In this connection, it is pointed out that the direct replacement of one solvent for another in the same group may change the properties of the synthetic rubber cement. In view of conservation, it is urged that, if possible, rubber manufacturers use blends of aromatic petroleum solvents with less critical non-aromatic (aliphatic) petroleum solvents, or replace the aromatic petroleum solvent of the blend with an 'alternate' solvent."

December 11, 1943.

UNITED STATES

Executives' Year-End Statements Optimistic; Government out of Scrap Rubber Business

Early in the month, possibly because of an adequate supply of good grades of scrap rubber, but more probably because of the increasing production of government synthetic rubbers, the Rubber Reserve Co. announced that the agreements designating H. Muehlstein & Co., Inc., Nat. E. Berzen, Inc., A. Schulman, Inc., and the Lowenthal Co. as scrap rubber agents of the Rubber Reserve Co. would be terminated at the close of business December 31, 1943. It is not expected, however, that this change will have much effect on the activities in the scrap rubber field for some time to come.

The Rubber Program in Brazil

Douglas H. Allen, president of the Rubber Development Corp., appeared before the Gillette Senate Committee on Agriculture in response to a request "for information concerning the procurement of rubber from South America and the expenditures connected therewith." He stated that the total amount spent between 1941 and October 31, 1943, was $78,208,195.79.[1] It was estimated that by December 31, 1943, the total of all disbursements will approximate $83,162,823, of which $59,710,477 will have been spent in the Amazon countries. Actual imports of crude rubber from all Western Hemisphere sources from April, 1942, to December 31, 1943, and including rubber content of tires and tubes, will be approximately 45,000 long tons, and from the Amazon 23,700 tons. Charging against these totals the total expenditures from April, 1942, to December 31, 1943, gives a cost of 82¢ a pound for wild rubber from all Western Hemisphere sources, including the Amazon, and from the Amazon countries alone of $1.12. These unit costs include charging to the cost of the rubber received to December 31, 1943, the entire cost of all capital expenditures, investments, loans, and loss on sale of tires and tubes, although capital expenditures should properly be prorated over the total amount of rubber received during the period of the rubber agreements which extend to December 31, 1946, just as the capital investment in synthetic rubber plants is being prorated over the rubber produced in a five-year period, it was stated. It was estimated that the average cost of rubber that will have been received from the Amazon during the period of the contracts will be less than 75¢ a pound after charging into the cost of rubber all expenditures of every kind.

Mr. Allen went on to say that results in 1943 were encouraging and indicated that the steps taken to stimulate the production of wild rubber were having the desired effect although the quantity produced was still short of war needs. Total imports of crude rubber into the United States from Latin America for the first ten months of 1943 aggregated 22,380 long tons, against 9,548 tons, for the same period in 1942, and it was estimated that imports from Latin America for the year 1943 will approximate 26,400 long tons, compared with imports for 1942 of 14,486 tons. Imports of natural crude from all sources, including those outside the Western Hemisphere, for the first ten months of 1943 were 51,008 tons, which was compared with the published estimate of the Rubber Director of total imports for 1943 of 60,000 tons.

A detailed comparison of the imports of natural rubber into the United States from the principal producing areas of Latin America for the first ten months of 1943 compared with the same period of 1942, as given by Mr. Allen, follows:

	Tons 1943	Tons 1942	Percentage of Increase
Amazon Countries*	11,040	3,575	209%
Central America	2,049	354	478%
Other America	2,668	1,407	89%
Mexico (Guayule)	6,313	4,188	51%
Salvage Rubber	310	24	1190%
Total	22,380	9,548	134%
Rubber content of tires and tubes acquired	2,836†	2,143	32%

* These figures do not include rubber shipped from the Amazon, but lost at sea through enemy action or other causes.
† 2,626 tons from Brazil and 210 from Mexico.

Dewey on Postwar Synthetic Rubber

Rubber Director Bradley Dewey in a speech at the Chemical Engineering Award Dinner, reported elsewhere in this issue, stated that some of the special synthetics such as neoprene, Buna N, and Butyl have qualities not found in crude rubber, and this will assure them of some place in the postwar picture. In the case of Buna S (GR-S) he felt that the high-cost units might ultimately go to the scrap heap, but that the low-cost units would be found to be a heaven-sent brake on the cost of tires and other rubber products for this country.

The Rubber Director along with other government officials inspected the new butadiene-styrene unit being operated by the Koppers United Co. near Pittsburgh, Pa., which started production during December. This new plant, called "Kobuta", is among the largest in the government program and has a rated annual capacity of 80,000 tons of butadiene and 37,500 tons of styrene, which is about one-seventh of the total program for these materials. The butadiene is manufactured by the catalytic decomposition of ethyl alcohol and the styrene by cracking ethyl-benzene. More than 80 million to 100 million gallons of alcohol will be used a year, and benzene is now being used at a rate of one million gallons a month at this plant.

Year-End Statements by Rubber Company Heads

P. W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co., in a year-end statement said that the most pressing tasks for America's home fronts in the months ahead were in the fields of the airplane, food, and tires. Production of all three must be sharply accelerated to meet the evolving needs of a victory-bent America, he added. In connection with food production, the pneumatic-tired tractor was considered the foundation of farm mechanization, and Goodyear expects to place great emphasis on tractor tire production during 1944. Goodyear also expects to convert facilities which can be spared from the production of guns and bullets to the production of tires and other needed rubber goods for civilian and military uses. With the nation's tires gradually wearing out, it is imperative that replacements be provided in order to keep essential cars on the roads, it was pointed out. In an over-all sense, 1944 looks like another boom year in most lines of business and a year which will call for the highest possible degree of national unity back of the fighting lines, he concluded.

John L. Collyer, president of The B. F. Goodrich Co., in his statement said that heavy demand for military tires and other rubber products indispensable to the Armed Forces may result in continuing shortages of many vital and essential rubber articles for civilian use during 1944. Conversion of rubber product manufacture from natural to man-made must be accomplished at an increasingly rapid rate or our supplies of crude rubber, still necessary in the manufacture of certain rubber products, will be exhausted. He stated that it was his conviction that there was one fundamental factor upon which America's long-range rubber policy can be founded—national security. There is a basic and undeniable kinship between American synthetic rubber plants and her battleships, air bases, arsenals, the Naval oil reserve, and

[1] Excluding the *Cryptostegia* plantation project in Haiti, on which has been expended to October 31, 1943, $4,832,802.53 bringing total disbursements to October 31, 1943, on natural rubber in the Western Hemisphere to $83,040,998.32.

CALENDAR

Jan. 7.	American Section, S. C. I. Perkin Medal Award. Hotel Commodore, New York, N. Y.
Jan. 14.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q. Canada.
Jan. 14-31.	National Foundation for Infantile Paralysis, Inc. Annual Fund-Raising Appeal.
Jan. 18—Feb. 15.	Fourth War Loan Bond Sale.
Feb. 4.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Feb. 11.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q., Canada.
Feb. 28—Mar. 3.	A. S. T. M. Spring Meeting and Committee Week. Netherland Plaza, Cincinnati, O.
Mar. 10.	New York Section, A. C. S. Nichols Medal Award.
Mar. 10.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q., Canada.
Mar. 14-15.	National Association of Waste Material Dealers, Inc. Thirty-First Annual Convention and War Conference. Hotel Astor, New York, N. Y.
Apr. 1.	Rubber & Plastics Division, Montreal Section, S. C. I. Joint Meeting with Montreal Paint & Varnish Production Club. Queen's Hotel, Montreal, P. Q., Canada.
Apr. 26-28.	Division of Rubber Chemistry, A. C. S. Spring Meeting. Hotel Commodore, New York, N. Y.
June 26-30.	A. S. T. M. Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y.

other projects maintained during peacetime to serve as nuclei around which to build adequate military strength for war. The question of how much synthetic rubber production should be continued after the war has a two-part answer: first, as much as the long-range planning of our Armed Forces may require, purely as a military security measure, possibly 150,000 to 200,000 or more tons per year, regardless of economic influences; and second, as much additional production as can be justified through free play of economic forces meeting postwar needs. The peoples of the world—and that most certainly includes those of the United States—should be the ultimate beneficiaries of the war-born, large-scale competition between natural rubber and synthetic rubber. This benefit may be in the form of lower-cost raw materials, lower-cost finished products, and the wider use of rubber made possible by its low cost in many new applications, he said in conclusion.

Herbert E. Smith, president of the United States Rubber Co., said that in the year 1943 this company had produced in its own manufacturing plants in the United States and Canada more than $400,000,000 worth of goods for war and essential civilian purposes, in addition to $350,000,000 worth of war products in the government owned plants which his company operated, making a total of $750,000,000. This amount, which is three-fourths of the normal peacetime production of the entire rubber industry, indicates the extent to which U. S. Rubber has been privileged to contribute to the war program, he added. As we enter 1944, we shall still regard our chief responsibility to be the continued production of products for the protection and safety of our fighting men, but we are now converting one of the ammunition plants which we operated back to the building of tires in accordance with the government's program to meet the tire shortage, he stated further. In conclusion Mr. Smith pointed out that one of the most important functions of management is planning. To the extent consistent with the war effort, U. S. Rubber is making postwar plans. These plans look forward to speedy conversion to give the public all the rubber products they once had, and more. The company will be able and equipped to make them of crude rubber or synthetic, or both —whichever is available and permits of the best quality at the lowest price.

John W. Thomas, chairman of the board of the Firestone Tire & Rubber Co., in his year-end statement said that 1943 was a significant one in the history of the rubber industry. It has been marked by new production records, achieved through splendid cooperation between labor and management and by great progress in finding ways to use synthetic rubber to better advantage, toward which the free interchange of "know how" and of current research findings between members of the industry has contributed immeasurably. He declared that he had confidence that in 1944 the research departments will continue to find new and better ways to use synthetic rubber, and it may well be that new and better synthetic rubbers for tires will also reward these efforts. We enter the New Year with production goals that constitute a real challenge, and the rubber industry will exert every effort to meet this challenge, he added. Work is well under way to increase tire production facilities by about 50%, and the objective is to have these new facilities ready by about July, 1944, but every car owner must realize that production increases are calculated to meet essential needs only, and continued tire conservation is most important, he concluded.

William O'Neil, president of The General Tire & Rubber Co., cautioned against devoting too much time to postwar planning until industry had finished its part in winning the war. We are becoming altogether too confident of victory, he believes. We all know now that it will come, but we cannot afford to spend the early months of 1944 in talking and planning conversion to peacetime products. No industrialist will deny that we must plan for the future, but plans can be made while production is going on, and that production should not be slowed for a minute to experiment with some system of making peacetime products, Mr. O'Neil stated further. Labor, too, seems overconfident. Eighty per cent. of the men at our plant are working harder than ever before, doing everything they can to turn out tires. Yet the other 20%, a small minority, but a serious bottleneck, have so reduced production that we are making no more tires in an eight-hour shift today than we did in a six-hour shift before the war. Let us concentrate on winning the war and get out every truck and plane and gun and tire we can today and do our planning after the day's work is done, he said in conclusion.

I.R.R.C. Wants U.S.A. on New Committee

It was announced on December 28 from London that the present International Rubber Regulation Agreement, due to expire December 31, will be extended for another four months, but without any regulatory functions.

An official announcement released by the British Information Service said in part: "The three signatory governments still available, i.e., the United Kingdom, the Netherlands, and India, are agreed in desiring international cooperation in matters affecting rubber and the retention of adequate machinery for consultation on possible future international action to deal with the postwar problems of the industry, including the interests and well being of the inhabitants of the producing areas. But they feel that, in its present form and with its present restricted membership, the existing committee is not an appropriate means of securing these objects. They have, therefore, for some time past, been considering the possibility of constituting a new and more widely representative committee for consultation and the collection of information. Such a committee should have, in their view, no powers of regulation of exports, production or planting, and membership on it would involve no obligations to restrict production or planting. It is the hope of the three governments that all other countries with a substantial interest in rubber or rubber substitutes, whether producers or consumers, will join the proposed committee."

The international regulation has been of no value since 90% of the world's supply of natural rubber has been in the hands of the Japanese nearly two years, but the present statement is interpreted as a desire to try and work out some means of interesting the United States in joining into some international agreement in view of our place at the head of the list of the world consumers of rubber and producers of synthetic rubber. The above-mentioned statement also says:

"The three governments hope the new committee, if formed, will point the way to international action which will secure the long-term interests of the rubber producers and consumers alike in conformity with such principles for an international commodity scheme as may be generally accepted after the war."

Combined Production & Resources Board, Washington, D. C., on November 24 announced the formation of a committee to deal with production and distribution of rubber tires and tubes in the United States, the United Kingdom, and Canada. The committee, composed of members representing the three countries, is under the chairmanship of L. D. Tompkins, Deputy Director of the **U. S. Office of the Rubber** Director, War Production Board. The committee, already working in close collaboration with a similar group in London, is assembling information in reference to requirements and productive capacity in all member countries. Following the collection and study of all pertinent data, the committee will recommend to CPRB such action as it believes advisable in the face of threatened shortages of tires and tubes for military and essential civilian operations. It was brought out in the discussion at the recent CPRB meeting that the possibility of expansion of tire and tube production in the United Kingdom was severely limited by the tight manpower situation in Great Britain, and it is apparent that the necessary increased production of tires and tubes will have to be achieved mainly in the United States or Canada, or both. Other members of the committee are: for the United States, C. E. Kohlhepp, director, Program Bureau WPB; for the United Kingdom, Howard Swiggett, deputy director general, British Ministry of Supply Mission, and B. J. O'Donnell, general adviser on rubber and rubber products, British Raw Materials Mission; for Canada, one member to be named shortly, and E. R. Medland, Washington representative of the Canadian Rubber Controller.

The National Association of Independent Tire Dealers, Washington, D. C., on November 29 gave Wm. M. Jeffers, president of the Union Pacific Railroad a bronze plaque for "the honorable performance of his duties, for his fairness and perseverance" while he was Rubber Director. Presentation was made at Omaha, Nebr., by Clifford C. Simpson, general manager of the tire association.

The War Department, Washington, D. C., has released a combination of captured enemy propaganda pictures and war front scenes photographed by Army Signal Corps and Navy cameramen. Full of reality, the film stresses the strength of the enemy and the toughness of the job ahead. The only antidote is the never-ending stream of American supplies that are seen flowing to the war fronts where our troops are viewed in action. One is convinced at the end that an Allied victory is inevitable—but only if complacency gives way to doubled effort. The film runs 43 minutes and is an outgrowth of a War Department conference held in September, at which data on enemy strength and American production problems were presented to a group of newspaper, industrial, and labor leaders. Organizations interested in obtaining this motion picture should contact the Industrial Services Branch, 90 Church St., New York, N. Y.

Russell B. Akin, E. I. du Pont de Nemours & Co., Inc., in Chicago, January 4, addressed the Society of Plastic Engineers on postwar uses of nylon as a plastic.

Revised R-1 Extends Use of Synthetic Rubber

The rapid conversion of the nation's rubber industry from crude to synthetics in the manufacture of rubber goods was brought into sharp focus December 4 when a revised Rubber Order R-1 was issued. Incorporating all directives from the Office of Rubber Director in the past four months, the amended order reflects the imposition of drastic controls upon the consumption of this country's diminishing crude rubber stockpile and emphasizes the liberalizing of restrictions on the use of synthetics made possible by increasing production of synthetic rubbers.

Several hundred products for which natural rubber was previously permitted may now be made only from general-purpose synthetic rubber or reclaimed or scrap rubber. In most cases these conversions to synthetics had been ordered by the Rubber Director before issuance of the amended order through directives to individual manufacturers. These have been formally incorporated in the order. Permitted products are now—to all intends and purposes—placed on an exclusive list, which sets forth detailed regulations for the use of natural rubber or latex. Where previously the list was confined to products for civilian use, it now brings under restriction the consumption of natural rubber or latex in the manufacture of products for military use. For most of the items listed for which natural rubber is permitted, consumption is limited to a specific percentage of the total volume of the rubber compound used in the particular product.

No quota restrictions are placed on consumption of so-called general-purpose synthetics for permitted products. These synthetics include Buna S and neoprene and may be consumed without limitation as to amount where their use is permitted in individual products. This same provision applies also to the consumption of scrap rubber. Several types of synthetic rubber, however, have been classified as special-purpose synthetics and placed under direct allocation by the ORD. These include neoprene types ILS and FR, Hycar OS-10, and Styraloy. The supply of each of these types is limited and allocation for specialized industrial and military uses. Not found adaptable for general use thus far, "Thiokol" N has been removed from R-1 in order to encourage experimentations in manufacturing uses.

The amended order also removes all quota restrictions on the use of reclaimed rubber, effective January 1, 1944.

Other important changes follow:

1. A production pattern for tires and tubes is established to assure maximum output from existing facilities in line with essentiality of demand. The effect of the provision is to expedite production of the most essential types of tires in their related order of importance before the identical facilities can be used to make less essential types. For example: when interchangeable facilities are involved, the following pattern must be adhered to: (1) airplane tires and tubes, (2) truck-bus tires and tubes, (3) farm tractor-implement tires and tubes, (4) industrial tires and tubes, (5) camelback, (6) passenger and motorcycle tires and tubes, and (7) bicycle tires and tubes. Within each of these broad categories, relative importance of specific tire types is detailed.

2. Through agreements with the OPA, purchase of specific sizes and types of solid tires and pneumatic tires and tubes for replacement on industrial equipment can now be made under a revised certification procedure set forth in the order. Such purchases are not subject to rationing regulations. Only special sizes of tires are covered, and they can be sold under the procedure only if for industrial—as against auto and truck—use. Sales of such tires are subject to the specific certification written into the order, which must be placed on every order blank.

3. General appearance of tires may change because of a provision banning "extras" for tires. Thus painting of tires and tubes for appearance is prohibited, and no wrapping of tires is allowed. Removal of minor light spots and other surface imperfections not actually affecting serviceability of tires is forbidden.

4. Restrictions are lifted on the sale of rubber gloves wholly of general-purpose synthetics or reclaimed or scrap rubber. Such gloves, however, must be properly labeled as to their rubber content. Other types of rubber gloves are limited to medical, government, and other specific uses.

5. Use of crude rubber or natural latex cement in making shoes is prohibited after January 1, 1944.

6. Preference ratings for the purchase of garden hose on civilian orders are suspended, for it has been found that equitable distribution could be effected without use of the ratings.

7. An indirect effect of the amended order may be to increase the supply of chilte, an ingredient of chewing gum. The material, imported from South America, is exempted from R-1 since it has been found unsuitable for essential rubber products.

8. Consumption of 200 pounds of general-purpose synthetics for experimental purposes during any 30-day period is permitted.

9. Inventories of reclaimed rubber are now limited to a 60-day supply, compared to a 45-day supply previously.

Amendment 1 to the revised order after January 1 sanctions the manufacture of several types of canvas rubber-soled shoes and other special types of rubber footwear previously prohibited. The amendment, in addition to creating a separate manufacturing category for "rubber-soled shoes of vulcanized construction", includes several other special types of footwear now allowed, such as men's five-buckle midweight arctics and men's storm king firemen's boots of the plain-toe type. Limitations are set on the average weight of crude rubber and latex for each type of shoe, but general-purpose synthetic rubber and reclaimed rubber may be consumed in any amount required for the manufacture of these products. Colors are restricted to black soles for all shoes, with white uppers for oxfords and women's gym shoes, black uppers for basketball shoes, and brown and black uppers for lace-to-toe bal shoes. The new shoes will be used to promote the training program of the Armed Forces and to meet essential civilian requirements.

Further conversion of the rubber industry to wartime use of synthetic rubbers instead of using the limited stockpile of natural rubber is reflected in Amendment 2 to R-1, effective January 1, which relates to mechanical rubber goods. All rubber items covered by Amendment 2 either reflect a prohibition in the use of crude rubber, or show a reduction in the percentage of crude rubber permitted in their manufacture. Conversion to synthetics is not expected to result in curtailment of supplies of any of the items, according to the ORD.

In general, the new regulation amends Rubber Order R-1 as follows:

1. It eliminates use of crude rubber wherever possible, and reduces the amount of crude in products where use of some natural rubber is absolutely essential.

2. It eliminates the section of the basic rubber regulations which specified use of certain compound grades (synthetic plus natural rubber) by the rubber industry. Specific percentages of crude rubber or latex have been submitted for each product permitted to be manufactured.

3. It reincorporates in the basic rubber regulations certain allowances for small-scale use of colored rubber for purposes of identification. The color regulations were included in the original rubber order, but were omitted from the order as amended December 4, 1943.

For the convenience of the rubber products industry WPB announced December 9 that the ORD has prepared a printed summary of all past orders and regulations issued as supplements to R-1 as amended December 4. The summary will be affixed to the R-1 as Appendix III, and its provisions will prevail in all instances of inconsistency with other provisions of the amended R-1. The orders and directives now collected in Appendix III relate principally to the conversion from crude rubber to synthetics. They have all been issued individually at various times in the past to the manufacturers of particular rubber products.

Supplement 1 to Appendix III indicates that after February 1 pipe rings, used to seal joints in gas and water mains, and milking machine inflations, elastic attachments which perform the same functions as is performed by the fingers in manual milking, must be made only from synthetic rubber.

Other Rubber Restrictions Eased

On December 23 the WPB revoked General Limitation Order L-90, limiting production of corsets, combinations, girdles, and other foundation garments made from elastic fabric. The order had been amended recently, lifting all restrictions on the use of elastic fabric in the manufacture of these garments. These restrictions had been in effect since December, 1941. Until the new action, however, manufacturers of corsets, girdles, etc., were restricted in their quarterly output to 75% of their first quarter 1941 production. In announcing the revocation, officials pointed out that while there is no practical scarcity of elastic fabric due to recent WPB action permitting manufacture of elastic thread and fabric from synthetic rubber, no great increase should be looked for immediately in the quantities of elastic-type garments available to consumers. The elastic thread used must be produced from synthetic rubber; consequently much remains to be done in the way of experimentation and testing before manufacture can attain large-scale proportions. Besides it will require time for the over-all production program—the fabrication of the elastic thread to the completion of the end product—to reach full-scale operations. Accordingly it is not expected that all-rubber garments will be available to the market before the early part of 1944, and it will be some time after that before the industry will be able to reach full-scale production.

In view of the increasingly critical shortage of malleable iron and the concurrent favorable position of manganese steel, the WPB on December 2 amended Limitation Order L-193—Conveying Machinery and Mechanical Power Transmission Equip-

ment, which now permits the use of Hadfield manganese steel in conveyer chains and sprockets and mechanical power transmission chains and sprockets. The amendment also provides that references to the usage of rubber, formerly contained in the order, will now be dropped as control over this commodity for use by the conveyer and power transmission industry is covered by R-1.

Under Conservation Order M-28 as Amended November 30, 1943—Dichlorodifluoromethane—refrigerating or air-conditioning systems utilizing synthetic rubber are excepted from those using rubber which are exempted from delivery restrictions covered by the order.

Additional WPB Announcements

Acceleration of the 240,000,000-pound high-tenacity rayon yarn program for production of synthetic tires is expected to result from recent WPB action designed to effect an interchange of technical information among the five producers of the yarn. The action—in the form of a letter to participants in the high-tenacity rayon program—will have the effect of making available "know how" to all participants in the program from manufacturers of longer experience in the technical aspects of producing the yarn. The letter calls for collaboration in the exchange of technical information on: 1. physical properties of the high-tenacity yarn and methods for testing it; 2. further improvement and development of the yarn and testing methods; 3. conversion and expansion of production facilities; 4. manufacturing techniques. The letter stipulates that information resulting from collaboration will be available uniformly to all five plants and to the Armed Forces. Operation of the plan will be confined to the exchange of technical information, and there shall be no limitation on the use by any of the concerns of the information exchanged. The letter went to: American Viscose Corp., Wilmington, Del.; Industrial Rayon Corp., Cleveland, O.; E. I. du Pont de Nemours & Co., Inc., Wilmington; American Enka, Inc., and North American Rayon Corp., New York, N. Y.

The November production of camelback at 25 million pounds was the largest on record, and future production is expected to be adequate to meet all essential needs for serving the tires of passenger and commercial vehicles, E. D. Wooldridge, manager of camelback and repair materials of the ORD, said December 17 in a statement issued by the Office of the Rubber Director. Demand for camelback, however, still exceeds production; so at present plans are in effect further to increase monthly camelback output. It is anticipated that peak production will be reached some time in January.

During the early period of the war the production of camelback was hindered by a shortage of reclaimed rubber. But now the production of retreading material is limited chiefly by a shortage of specialized milling and mixing machinery.

Camelback contains no scarce natural rubber. Instead the retreading material contains a combination of reclaimed rubber and synthetic rubber. Two types of camelback are produced, one containing approximately 60% synthetic rubber (used for truck tires), the other containing about 40% synthetic rubber (used for passenger tires).

Limitation Order L-114, as Amended November 22, 1943—Safety Equipment—prohibits, with certain exceptions, the use of, in making safety equipment or any component part thereof, the following: aluminum, asbestos cloth, chromium, copper, copper base alloys, nickel, corrosion resisting steel, alloy steel tin, synthetic plastics, rubber, synthetic rubber or elastic fabrics, as defined in Conservation Order M-174.

Priorities Reg. 3, Direction 4 (December 3)—Hand Tools and Safety Equipment Purchased by Employes—relates to hand tools and certain safety items specifically designed and used for protection against specific occupational hazards, including asbestos clothing, safety clothing impregnated or coated to make it resistant against fire, acids, other chemicals, or abrasives, safety industrial rubber gloves and hoods and linemen's rubber gloves and sleeves, gas masks, respirators, face and eye shields, goggles, safety belts, harnesses, and helmets.

L-317 contains restrictions on the manufacture and use of fiber shipping containers. Among the products prohibited to be packed in such containers are rubber and fabric hose. Among the goods that may be packed in such containers on a quota basis are: household adhesives, athletic equipment and sporting goods, clothing (except shoes and safety clothing as defined in L-114), combs, games and toys, mattresses four inches or more thick, varnishes and waxes.

Allocation Order M-30, as amended November 24, 1943, permits purchasers to acquire 7,900 gallons of ethyl alcohol in any calendar quarter without WPB authorization; the previous limit was 3,500 gallons.

General Preference Order M-112, as Amended December 4, 1943, indicates that under certain conditions deliveries of antimony from persons other than the Metals Reserve Co. may be made or accepted by any person without specific authorization from the WPB. Reports, however, will still be required to permit the Board to observe the position of the metal.

Preference ratings below AA-2 for pure titanium dioxide were voided December 6 except on military orders. The purchaser is required to certify to military orders, thus validating whatever rating the purchase carries. Non-military orders not bearing an AA-2 rating are to be filled as non-rated orders to the extent that supplies are available, according to Conservation Order M-353, issued December 6.

Committee Reports

The WPB Shoe Task Force Committee, reporting to the Shoe Manufacturers' Industry Advisory Committee and the Shoe Retailers' Committee, recently made recommendations to alleviate the critical supply situation confronting the footwear trade. Among the points mentioned was greater emphasis on non-leather shoes. The Shoe Task Force Committee finds that adequate raw material exists for production of 15 to 20 million pairs of canvas vulcanized rubber-soled shoes for next summer's wear, particularly for boys. The Committee further feels that there should be a rise in the output of rubber taps, soles, and heels; it is estimated that a 30% increase is possible with a moderate quantity of additional manpower.

The Fire Hose Manufacturers Industry Advisory Committee held its first meeting December 7 when the manufacture and distribution of cotton and linen rubber-lined fire hose under the provisions of Order L-39 were reviewed and proposals for possible revision of the order discussed. Howard Frank is the government presiding officer. Members of the committee follow: H. F. Breesler, Goodyear Tire & Rubber Co., Akron, O.; H. P. Schultz, Lee Rubber & Tire Corp., Youngstown, O.; Chas S. Cole, Fabric Fire Hose Co., Sandy Hook, Conn.; Harry E. Smith, Raybestos-Manhattan, Inc., Passaic, N. J.; C. F. Conner, B. F. Goodrich Co., Akron; E. W. South, Hamilton Rubber Co., Trenton, N. J.; J. H. Hayden, Hewitt Rubber Co., Buffalo, N. Y.; W. F. Spoerl, United States Rubber Co., New York, N. Y.; W. I. Lewis, Boston Woven Hose & Rubber Co., Cambridge, Mass.; R. S. Wharton, Quaker Rubber Co., Philadelphia, Pa.; J. E. MacDonald, Jr., Whitehead Bros. Rubber Co., Trenton.

Production of adhesive plaster was discussed at a special meeting December 3 at the request of the Surgical Dressing Industry Advisory Committee, of which Howard Frank is the government presiding officer. Adhesive plaster manufacturers have been using crude rubber at the rate of from 1,000 to 1,500 tons a year to meet present civilian and war requirements. Curtailment of the amount of crude available for the first quarter of 1944 and the substitution of synthetic rubber give rise to various production problems, industry members said. Shrinking stockpiles of crude rubber necessitates this substitution. Production problems will be given further consideration at a meeting in the near future.

E. O. Staton, of Tucker Duck & Rubber Co., Fort Smith, Ark., is on the Canvas Folding Cot Industry Advisory Committee.

C. W. Tucker, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., is a member of the Peroxygen Chemicals Industry Advisory Committee.

Office of Economic Warfare, Office of Exports, Washington, D. C., in "Current Export Bulletin No. 133" states that the following rubber automotive replacement and repair parts: rubber cement, fan and generator belts, hose, packing rings, gaskets, and floor mats, when exported solely as automotive replacement parts, may be entered on a single export license application, on which it should be clearly indicated that the goods are required solely for automotive repair and replacement purposes. It is also essential that the total weight of each item and the net weight of the total rubber content of each item be declared.

Pennsylvania Rubber Co., Jeannette, Pa., through R. B. Cave, sales manager, has announced the appointment of T. D. Struthers, factory zone branch manager, as manager of the company's branch in New York, N. Y., and the appointment of T. F. Newlin as Mr. Struthers' successor. Mr. Struthers obtained his early training in Akron before joining Pennsylvania Rubber, where his progress was rapid, and in 1935 he was appointed factory zone branch manager. Mr. Newlin comes to Pennsylvania from the Firestone Tire & Rubber Co., where he served successively as general salesman, representative for truck and tractor tires, and field supervisor for the Pittsburgh area.

Pennsylvania Rubber is now in full production of a new synthetic rubber tennis ball, said to be an improvement over the prewar natural rubber tennis ball.

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has made Morton Starr Cressy, Jr., sales representative of the chemicals and intermediate department. Mr. Cressy, who has been identified as head of the aniline, rubber accelerator, and beta naphthol plants at Bound Brook, joined Calco in 1933 as engineer of the aniline plant.

New Footwear and Tire Prices Set

Use of Buna S in waterproof footwear necessitated technical changes in minimum quality specifications in MPR 132—Waterproof Rubber Footwear—(Amendment 5, effective December 1). Manufacturers may use thinner gages of Buna S compounds because it has been found that their use will not reduce the serviceability of the footwear. Besides, after specific approval by OPA, manufacturers may make other changes in the specifications when such changes improve the serviceability of the footwear or avoid a threatened impediment to production. Such provisions, however, are temporary, pending collection of more accurate technical information on Buna S waterproof rubber footwear. Amendment 5 also provides specifications for several alternate constructions that OPA believes will result in footwear fully as serviceable as that made under the previous standards.

Manufacturers' maximum prices for a limited number of types of canvas rubber-soled footwear appear in Amendment 6 to MPR 132, which, effective December 15, also changes the title of the regulation to "Certain Rubber Footwear." Retail ceilings for such footwear will be issued by the time the shoes, now permitted under Amendment 1 to R-1,[1] reach the consumer market this coming spring.

Canvas rubber-soled footwear of vulcanized construction for civilians had not been made since June, 1942, because of the shortage of crude rubber and canvas. The standardized styles now permitted OPA believes comparable, when made according to specifications filed with OPA by their manufacturers, to the footwear made prior to the restriction measures. The new footwear, therefore, is priced at the level in effect in the Fall of 1941 for kinds of canvas-rubber footwear that had about the same serviceability.

The prices established apply only to sales by manufacturers, who must deduct from them all discounts, allowances, and other deductions from the list price in effect to a purchaser of the same class on December 3, 1941. If a manufacturer was not then selling canvas footwear, he must use the discounts and other deductions he allowed on the most recent date prior to the base date; or if he had no discount policy during 1941, he must use that of his most closely competitive seller.

Coincident with the issuance of Amendment 6 came Amendment 13 to MPR 220—Certain Rubber Commodities—which removes from its coverage the canvas-rubber footwear placed under MPR 132, and also coated fabrics, now controlled by MPR 478—Coated and Combined Fabrics.

Amendment 5 to MPR 403, effective December 11, emphasizes that canvas-topped rubber footwear is not covered by the regulation unless it is of vulcanized construction; footwear that is stitched or cemented is under the General Maximum Price Regulation.

Amendment 1, MPR 477—Sales of Rubber Heels and Soles in the Shoe Factory Trade—effective December 4, sets forth how manufacturers may determine their ceilings for odd-size rubber heels and soles they sell to footwear manufacturers for shoes for civilians. The amendment, further, adds the description "Standard Carbon-Black Type" to most categories of heels and soles listed in the regulation, which was intended to apply only to this type of rubber; the change in wording was made to clarify this intention.

Specific ceilings in Amendment 15 to RPS 63—Retail Prices for New Rubber Tires and Tubes—effective December 15, include those for several sizes and brands of synthetic rubber tires and tubes that did not appear on the November 25, 1941, price lists of the brand owners and therefore could not be priced under provisions already in the schedule. A tube carried by Pharis Tire & Rubber Co. in November, 1941, at the $3.65 price level is added to the price list applying to that company's brands. Fisk Construction Service tires that United States Rubber Co. proposes to sell are assigned the same specific ceilings as the Fisk Con-Trak-Tor line, with which they are identical. Similar action is taken in relation to Gillette Tri-Rib and Gillette Tractor Equipment tires. The name Triplex Tire Co. is removed from one section of the four-ply passenger-car tire schedule since the company does not make such a four-ply tire. The name Indiana Farm Bureau Cooperative Association, Inc., is eliminated from another section because it belongs to National Cooperatives, Inc., whose tires already are listed.

Amendment 7 to MPR 119—Original Equipment Tires and Tubes—and Amendment 4 to MPR 415—Certain Federal Government Purchases of New Rubber Tires and Tubes—again postpones, this time from December 1 to January 15, 1944, the effective date for ceilings for new rubber tires and tubes wholly or partly of Buna S and intended for the Federal government.

Several orders have been issued under MPR 143—Wholesale Prices for New Rubber Tires and Tubes. No. 2 establishes ceilings for Robbins first-line heavy-duty inner tubes made by Robbins Tire & Tube Co., Inc., Tuscumbia, Ala. No. 3 relates to Vogue DeLuxe passenger-cars of S-3 construction, product of The Kelly-Springfield Tire Co., Cumberland, Md. and sold to Vogue Rubber Co., Chicago, Ill.; while the fourth order refers to maximum prices of these tires as sold by Vogue Rubber Co.

December tire and tube rationing quotas were not greatly changed from those of November, and the continuing shortage of both new passenger tires and new truck tires is reflected in these figures. A separate quota of farm tractor and implement tubes, however, was set up for December; previously such tubes had been charged to the truck and bus tube quota. A comparison of November and December figures follows:

December		November
	Passenger and Motorcycle	
581,373	Grade I	553,688
829,350	Grade III	829,650
645,477	New Tubes	645,494
	Truck and Bus	
200,519	New Tires	200,248
258,187	New Tubes	297,642
	Farm Tractor and Implement	
32,200	Tires	46,000
32,200	Tubes	

More amendments have been issued to RO 1A—Tires, Tubes, and Camelback. No. 60, effective December 1, extends eligibility for tires made principally of reclaimed rubber to those persons heretofore eligible for used tires. Others who may also obtain these used and war tires include military personnel who obtain gasoline for official travel in their private cars. These provisions are made by reclassifying reclaimed tires from Grade I (new tires) to Grade III (used tires) in order to meet the increased demand for used tires. The amendment also allows, in the interest of greater efficiency, a central accounting office of a tire dealer to arrange through its own OPA district office for the redistribution of stocks of tires, tubes, and camelback from one of its local outlets to another in need of them.

Amendment 61 (December 1) removes from rationing the recapping of tires for commercial vehicles with truck-type camelback, following the request of the ORD in order to encourage more effective use of recapping service and thereby contribute to tire conservation by reducing the demand for replacement tires. This step is now possible since adequate stocks of synthetic rubber are being made available by the ORD for increased camelback output. But the use of truck-type camelback will still be restricted by WPB Order R-1 to tires used on commercial vehicles only. The amendment also eliminates all branding requirements for passenger tires and permits the recapping of those branded tires (Emergency Tires received originally through the Defense Supplies Corp. collection about a year ago) that warrant the service. The recapping of unserviceable tires continues banned under the provisions of R-1 which are to remain in effect. Amendment 61 also allows the sale to a consumer of a tire which, although unsuitable for recapping, is usable as is or can be repaired for use.

The next amendment, effective December 14, makes Canadian residents driving their automobiles or motorcycles in the United States for occupational or other essential purposes eligible to buy used and reclaimed tires and new tubes in this country. Canada permits American motorists driving their cars in the Dominion to obtain tires and tubes.

A plan (Amendment 63) of double-checking truck tire inspections to see that every tire in service gives its last possible mile of wear to essential commercial transportation before being replaced by a new tire drawn from dwindling stocks was announced December 14 by the OPA, which is being assisted by the Office of Rubber Director, the Office of Defense Transportation, and members of the tire industry in setting up the plan. With truck tire inventories now below the accepted minimum, OPA will designate Central Truck Tire Inspection Stations throughout the country in areas where truck registrations are heavy. These stations, to be privately owned and operated by men trained in tire care and conservation, will reexamine all tires recommended for replacement by official OPA tire inspectors within the area and will search out and return to service tires still good for more miles of vital wartime transportation. Tubes to be replaced, however, need not be inspected by a central station. Fixed fees to cover operating expenses will be charged by the central station for its inspection. It is expected that central stations will be provided in about 200 cities throughout the country, covering a large percentage of truck registration. Provision is made for inspections of tires at the applicant's place of business in special situations. [The National Association of Independent Tire Dealers, incidentally, is protesting the plan in the interests of "regular industry practices."]

Amendment 4, RO 1E—Mileage Rationing: Tire Regulations for the Territory of Hawaii—effective December 23, redefines a "Grade I" tire as a new prewar passenger-car tire of 85% level or above, or a new synthetic rubber tire; while a "Grade III"

[1] See p. 387.

tire is limited to passenger type and means a new tire made principally of reclaimed rubber as specified by the WPB, a new prewar tire, below the 85% level, or a used or recapped tire.

Other OPA Rulings

Amendment 4 to MPR 403—Certain Rubber Commodities Purchased for Governmental Use—effective December 9, restores to coverage by the regulation fairings for propellers. Also changed is the report form in the order; the title was amended to include the number of the regulation, and August 1, 1943, was substituted for June 1, 1943, as the base date for synthetic rubber prices to conform with the date changes elsewhere in the regulation; besides a column heading was added to the report form to provide space for manufacturers to enter the base dates on which the rates or prices used in price computations were in effect.

The pricing method to be used by manufacturers of corsets, brassieres, girdles, and garters made with synthetic rubber, which in March, 1942, had been made with natural rubber, is the same as that in effect for other rubber commodities covered by MPR 220 whose construction is changed from that of March, 1942, only because of substitutions due to shortages of materials or parts. This is the second pricing method given in the regulation, whereby the manufacturer may adjust his highest March, 1942, selling price for the article by the exact amount of the increase in direct cost caused by the change in materials or parts; that is, by the change from natural to synthetic rubber in such parts as the elastic webbing.

Amendment 3, MPR 420—Hardwood Heel Blocks and Finished Hardwood Heels—effective December 20, adds several price listings to the regulation and defines "topliff" as "a topliff made of leather or rubber (including synthetic rubber)."

Amendment 3, MPR 276—Asphalt Tile—effective December 9, establishes ceilings for asphalt floor tile and greaseproof asphalt tile made by Hood Rubber Co., Inc., Watertown, Mass., a new producer of these items.

To maintain production of butyl alcohol in United States territories and possessions Amendment 11 to MPR 37—Butyl Alcohol and Esters Thereof—effective December 10, increases by 3c a pound the ceilings for the chemical produced in those areas. Other revisions in the regulation pertain to: establishing deposit charges for containers used in shipping; rewriting the credit provision; sales and deliveries of butyl alcohol by Defense Supplies Corp.; and reduction in the price of dibutyl phthalate.

Amendment 5 to MPR 295, effective December 17, gives sales to government agencies of West Coast ethyl alcohol by the Defense Supplies Corp. the same exemption from price control as ethyl alcohol produced in other areas. The amendment also modifies the provision for computing ceilings for containers used in transporting ethyl alcohol, as part of the program to make the treatment of container charges uniform among OPA solvent regulations. Similar action was taken in the case of containers for acetone and butyl alcohol.

Amendment 20 to Order No. A-1 under MPR 188 — Manufacturers' Maximum Prices for Specified Building Materials and Consumers' Goods Other Than Apparel—effective December 8, to permit essential production of pyrophyllite, authorizes a 40c-a-ton increase in ceilings for the product, which represents the amount necessary to return the total producer cost of making and selling this material. Pyrophyllite is used as a filler for composition battery boxes, in the rubber industry as a dusting material, as a filler or carrier for insecticides, in the ceramic industry, and in the paint industry as a pigment extender.

MPR 497, effective December 9, establishes maximum prices for antimony metal and antimony compounds.

EASTERN AND SOUTHERN

Exposition of Chemical Industries Previews Postwar Trends

The exhibits at the Nineteenth Exposition of Chemical Industries held this year in Madison Square Garden, New York, N. Y., December 6-11, inclusive, strongly featured present war work, but important contributions to future progress were never hard to find. Chemists, engineers, industrial executives, research and plant operation personnel made up the greater part of the audience, which was restricted by invitation and registration to persons directly connected with chemical process industries or other industries having a definite chemical interest. Army and Navy personnel, including representatives of a number of the specialist branches, comprised a substantial contingent among the visitors.

Because of the U. S. Army's occupation of Grand Central Palace, the exhibit was held in the most accessible and next best equipped location available; namely, Madison Square Garden. This smaller hall necessitated drastic cuts in the number and sizes of the booths. In many cases photomurals and flowsheets replaced cumbersome machinery that otherwise would have been shown. Machinery of interest to the rubber industry included mixing equipment, presses, agitators, ball and grinding mills, colloid mills, and with the expanded activities in synthetic rubber manufacture tanks, pumps, driers, filter presses, metering devices, etc. took on new significance.

The American Chemical Society featured models of cracking operations of two different types, used in the manufacture of aviation gasoline and synthetic rubber. One of these employs a new synthetic bead catalyst which is reported to increase the yield of aviation gasoline from 13 to 30% over present processes. The second cracking process demonstrated employs a so-called "fluid" catalyst, which is, in fact, a powder so finely divided that it can be completely dispersed by agitation with air or gas and circulated like a liquid. Also on display at the A. C. S. exhibit was the "heatronic" molding of plastics, in which the molding material is electrostatically preheated.

The American Hard Rubber Co. exhibited products made from synthetic rubber and Saran, including pipe and fittings. The American Instrument Co. had on display its low temperature cabinet which has found much use lately in the rubber industry, high-pressure hydrogenation equipment, and physical testing equipment for the rubber laboratory. Baker Perkins, Inc., exhibited a general-purpose laboratory mixer of latest design, jacketed for steam and water and equipped for vacuum operation. The Brabender Corp. featured among other things a semi-automatic moisture tester which combined an analytical balance and drying oven in one unit and permitted the direct reading of moisture content in per cent, with an accuracy of ± 0.1%. The Cambridge Instrument Co. exhibited a new four-point automatic gas analyzer which continuously and simultaneously records oxygen, carbon dioxide, carbon monoxide, and hydrogen present in a sample of gas.

Among the new devices displayed by the Dorr Co. was the new deionization water treatment system. The Exact Weight Scale Co. had an interesting exhibit in a new electronic tare compensator that makes possible a quick balancing of the weight of empty containers of different weights and eliminates the process of correcting the tare by separate weighing for each container filled. Developments of the last two years in the use of rotameters for flow measurement and control were featured at the exhibit of the Fischer & Porter Co. One of the latest designs announced at the show was the "Rotamatic" air operated flow controller. Also exhibited was a new magnetic-transmission rotameter recorder with spring-operated chart clock which can thus be made completely explosion-proof.

Hercules Powder Co. displayed a colored map showing different chemical products manufactured by the company and sections of the chemical world from which each product comes. Synchronized with the map were turntables divided into three sections, which depicted typical chemicals from the company's cellulose, naval stores, synthetics, and paper-makers' chemical departments. The Neville Co. featured its various resins and plasticizing oils, many of which are used by the rubber industry. Of considerable interest was the exhibit of the U. S. Stoneware Co. which in addition to its standard chemical stoneware, displayed Reanite, a plastic bond for uniting rubber to metal, metal to metal, or many other substances. The strength of the bond is said to be stronger in many cases than the materials themselves.

General Electric Co., Schenectady, N. Y., has created a standards policy committee, headed by L. F. Adams, manager of the standards division, to be responsible for the development and maintenance of sound design engineering and manufacturing standards and practices for use throughout the organization.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the retirement of Francis J. Byrne, 65, assistant director of the public relations department, with which he has been connected since its inception in February, 1916. Mr. Byrne was tendered a dinner on December 15 by his past and present staff associates.

Joseph Stokes Rubber Co., Trenton, N. J., at a board meeting December 18 elected Walter E. Harvey vice president. Mr. Harvey is also a vice president of Thermoid Co., Trenton, which recently acquired the Stokes company. R. H. Temple, secretary-treasurer of Thermoid, was elected secretary of Joseph Stokes Rubber Co. at the same meeting.

War Goods on Display

Typical of an industry geared to the war effort was the exposition of war products by United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., held in Rockefeller Center from December 2 through December 18. Although rubber, especially the synthetic, formed the keynote, many non-rubber items also were shown.

An extensive range of mechanicals included expansion joints, molded rings for pipe lines, mountings, hose, belting, valve seats, lamp guards, and packing; while tires, for use under any and every condition, ran from small models for the tail wheels of planes to giant earthmovers and casings for bombers. The advantages of rayon and nylon for such products were stressed. Rubber chemicals also were featured along with samples and goods of reclaimed rubber. A large map revealed past and present sources of natural rubber. The footwear display was all-embracing, from heels to soles, from Army mukluks for the Arctic to jungle boots for the tropics, from regular Navy training shoes to special models for submarine wear. Nor was the civilian worker neglected. Navy diving equipment, wading, fire fighting, and life saving suits also attracted attention, as did a synthetic-rubber-coated convoy balloon.

Conspicuous was a model of the synthetic rubber copolymer plant at Institute, W. Va. Besides were samples of GR-S, Buna N, neoprene, "Thiokol", and Butyl. The bounce of each was in decided contrast to that of natural rubber. Another demonstration revealed the superiority of specially compounded synthetic rubber over crude in a cold test at –60° C., for aeronautical applications.

Bullet sealing hose and self-sealing fuel cells and tanks proved interesting; so did life rafts in different sizes, fully equipped for extended and enforced navigating. Attention arresting was electrically conductive rubber in footwear, industrial tires, mixing buckets and trays, gun heaters, and carrying containers, and as an anti-icer on airplane propellers. Other rubber goods displayed were battery parts and separators, linings for tanks to prevent corrosion, grinding wheels, druggists' sundries, wire and cable, a muzzle piece for a horse's gas mask, tank treads and bogie wheels, and pads for hydro-press forming operations.

Vinylite was used in the WAC and Army raincoats, Army rainsuit, and Navy parka suit. Synthetic resins coated fabrics—many multi-colored for camouflage—for such items as tents, jungle hammocks, waterproof bags for food, clothing, cooking, and carrying Signal Corps equipment, and water sterilizer bags. Cotton yarn for tire cord and fabrics, Ustex yarn for parachute webbing, Asbeston for fire fighting suits and tubing likewise were exhibited.

Special developments as Multipore, microporous rubber filtering media, and the Ekko process, electroforming with pure iron, created interest. Other products, which the rubber company took on after Pearl Harbor, are machine tools as well as munitions.

Synthetic rubber production in this country hit a new high in November when the three synthetic rubber plants operated by U. S. Rubber produced 11,175 long tons, stated President Herbert E. Smith at the preview of the company's War Products Exhibit. The output exceeded the schedules of the Rubber Director's Office and in one plant surpassed rated capacity. The production of these three plants in November alone was equivalent to enough rubber with which to make 2½ million passenger-car tires.

Gillette Plant Reconverts to Tires

With the urgent need of more tires for the war effort and essential civilian transportation, the Eau Claire, Wis., ordnance plant of U. S. Rubber is speeding plans to reconvert back to tire production, Plant Manager Howard O. Hutchens announced December 26. It is expected that the first tires will be rolling off the finishing line by late spring and that capacity production will be attained in the latter half of 1944. When this reconversion program is completed, and full production reached, Eau Claire will be one of the largest tire building plants in the Midwest with a capacity substantially greater than before the war, according to Mr. Hutchens. But only large-size tires for combat vehicles and airplanes and truck and bus tires for essential civilian transportation will be produced for the duration.

Basic tire building equipment including Banbury mixers, vulcanizers, presses, molds, and calenders used for making various types of synthetic tires, has already been purchased and will be installed as rapidly as possible. Additional buildings will be erected virtually to double the plant's previous square footage, and new equipment installed throughout to make it one of the most modern tire factories in the country.

A large number of men will be required for the job of reconverting the plant back to tire production, stated Mr. Hutchens, and besides all the rubber workers formerly employed there, several hundred additional will be needed, making personnel the greatest in the plant's tire building history.

Previously known as U. S. Rubber's Gillette tire plant, it was sold to the government at the time of conversion to ordnance, with the rubber company continuing to operate it on a contract basis.

In a later statement President Smith declared that to relieve the critical essential tire shortage U. S. Rubber is expanding the production facilities of four of its major tire plants, including the Eau Claire one and, those at Chicopee Falls, Mass., Detroit, Mich., and Los Angeles, Calif. The company will spend more than $20 million to increase the output of these plants.

Other U. S. Rubber News

John J. Donahue, production superintendent of the fuel cell department of U. S. Rubber at Detroit, was transferred, effective December 15, to the Fisk tire plant at Chicopee Falls, Mass., where he will be superintendent in charge of tire production, according to J. W. McGovern, general manager of the company's tire division. A native of Providence, R. I., Mr. Donahue started with the rubber company in 1915 in its Providence plant and in 1922 went to the Hartford, Conn., plant as foreman. He was transferred in 1929 to the Detroit plant as general foreman of the tire department, where he subsequently became superintendent in charge of fuel cell production.

Ketchel F. Morlen has been appointed manager to handle U. S. Tire sales for the Detroit district, according to A. B. Fennell, sales manager of U. S. Tire division. Mr. Morlen joined the company in 1934 at the Detroit branch, and two years later was transferred to the field engineering and service department. After three years he became assistant to the division manager of the Kansas City, Mo., office, in 1941 assistant manager of airplane tire sales, and in July, 1942, war products representative to contact the Ordnance Department and the Central Procurement District of the Air Forces in Detroit on the engineering and procurement of all products made by U. S. Rubber.

To assist motorists to secure maximum mileage from every tire now in service, Fisk held a two-day clinic at Boston, Mass., December 21 and 22 to instruct its New England tire distributers in the use of synthetic materials for recapping. The two-day instruction, which included repairing synthetic tires, was under the supervision of S. Schnitman, Fisk tire representative who recently completed the intensive course at the company's recapping and repair school at Detroit, Mich.

U. S. Rubber field engineers last month held their annual conference at Detroit at which was presented a comprehensive report on the good job synthetic rubber passenger-car tires are doing throughout the nation under wartime driving conditions. Wallace C. Manville is manager of the field engineering and service department.

An illustrated wall chart showing in detail the proper way to mount synthetic rubber tires is being offered free to all tire service stations, dealers, garages, and distributers by U. S. Tire Division. The chart is designed to overcome one of the greatest causes of unnecessary tube failures resulting from improper mounting.

Mr. Smith has accepted the chairmanship of the Rubber Division for the Fourth War Loan, according to John A. Brown, president of the Socony-Vacuum Oil Co. and chairman of the industrial section of the Commerce and Industry Division, of which Wm. E. Cotter, of Union Carbide & Carbon Co., is director. Mr. Smith, assisted by committeemen to be appointed, will ask each of the more than 125 concerns in the Rubber Division to cooperate with the United States Treasury Department in the sale of the Fourth War Loan bonds by having a company representative named. The Fourth War Loan bond sales run from January 18 through February 15.

Carrier Corp., Syracuse, N. Y., on December 13 held graduation exercises for 101 of its employes who had just completed the first session of the Carrier Institute of Business. This Institute, which has as its purpose industrial education and better labor-management understanding by Carrier, is conducting 13-week courses of lectures by nationally known business authorities and company officials. C. Wampler, president of Carrier Corp., was the keynote speaker at the exercises, and introduced William P. Tolley, chancellor of Syracuse University, who lauded the graduates, envisioning a "splendid future" for industry if their pioneer effort in the new channel of education spreads to the rest of industrial America. Bernard McPeck, who presided at the graduation exercises, was chairman of the employe committee governing the activities of the Institute. He was assisted on the committee by Helen G. Curran, Raymond Mahar, Janus W. Moore, Albert Spichiger; Sr., W. A. Bowe, technical advisor, and E. Urquhart, secretary.

Woburn Degreasing Co. of N. J., producer of organic chemicals, Harrison, N. J., following action of stockholders, changed its name to Woburn Chemical Corp. (N. J.) in order to conform more with the present nature of its business, according to President A. G. H. Reimold. Heavy production of organic chemicals is now centered in plants at Harrison, N. J., and Toronto, Canada; while production of insecticides and fungicides will continue at Elkton, Md., and Moore Haven, Fla. Degreasing operations on leather and wool have been transferred to the Woburn, Mass., plant of an affiliated company.

Office of Rubber Director

As of December 17, 1943

TITLE	NAME	ROOM	PHONE RE 7500 Ext.
Rubber Director	**Bradley Dewey**	5001	2455
Ass't. to Rubber Director	Stanley Osborne	5001	2455
Ass't. to Rubber Director	Morehead Patterson	5007	6332
Administrative Officer	F. P. Downey, Jr.	5009	71193
Deputy Rubber Director in Charge of Operations	**L. D. Tompkins**	5014	3256
Tires & Tubes Section	G. E. Beardshaw, Chief	5156	75532
Repair Materials Unit	E. D. Wooldridge, Chief	5156	75532
Drug Sundries Section	E. J. Casey, Chief	5144	75448
Footwear, Soles & Heels Unit	F. R. Olson, Chief	5142	74976
Coating, Proofing & Spreading Section	G. R. Toney, Chief	5142	74976
Mechanical Goods, Wire & Cable Section	J. E. Skane, Chief	5004	71718
Scrap & Reclaim Section	C. F. Smith, Jr., Chief	5146	75646
Allocations & Statistics Branch	G. B. Kayser, Chief	6062	75680
Statistics Section	H. M. James, Chief	6054	76950
Production & Priorities Branch	J. H. Higgins, Chief	6066	3478
Priorities Section	L. P. Best, Chief	6090	73779
CMP Unit	E. Slinkard, Chief	6090	76000
Services Unit	Gerald Perry, Chief	6090	6790
Production Section	W. E. Ireland, Chief	6066	3478
Ass't. Rubber Director in Charge of Plant Construction	**F. R. Creedon**	4149	2513
Chief Construction Engineer	W. E. O'Brien	4149	75310
Ass't. Rubber Director in Charge of Product Development Conversion	**E. B. Babcock**	5130	6104
Industry Branch	G. L. Allison, Chief	5130	73906
Educational Branch	H. E. Simmons, Chief	5136	73895
Conversion Branch	A. H. Nellen, Chief	5143	75470
Ass't. Rubber Director in Charge of Research and Development	**E. R. Gilliland**	5029	3637
Butadiene & Styrene Branch	C. C. Monrad, Chief	5033	75659
Copolymer Branch	J. C. Elgin, Chief	5026	75521
Program Planning & Data Analysis Branch	W. B. Wiegand, Chief	5024	71503
Copolymer Research Branch	C. S. Fuller, Chief	5025	71642
Research Compounding Branch	N. A. Shepard, Chief	5023	74459

NOTE. The above listing of key personnel of the Office of the Rubber Director is published since an appreciable number of men have resigned during recent weeks, and it appeared that it would be of value to know the latest chart of this organization.

OHIO

General Tire & Rubber Co., Akron, has appointed Joseph F. Sloate manager of personnel, according to President William O'Neil. Mr. Sloate until recently was chief of plant administration at the company's new synthetic plant at Baytown, Tex. Mr. Sloate has been experienced for nearly a quarter-century in most all departments of tire manufacture and sales. He has served the company in many cities throughout the United States in various capacities.

Construction of the new General Tire plant at Waco, Tex., began about January 1, according to Robert Iredell, chief engineer. Brown and Root, Texas contractors, have been awarded the contract for the three-million-dollar tire factory. The buildings will be ready May 1, and machinery is expected to arrive at that time. Actual tire production is scheduled for the late summer, and the Waco plant will be confined entirely to truck tire building.

Additions to the main factory at Akron also are under way, Mr. Iredell said. These additions to be built at a cost of $600,000 will include a new laboratory, a new office building, and additional milling capacity.

General Tire has developed Silentbloc, a method of vibration absorption which uses rubber and steel, eliminating the uncertainties of the bonding process of holding rubber to metal by forcing at high speed, between two pieces of metal. Silentbloc, with many war uses now and several peacetime possibilities, will sustain axial, radial, conical, or torque loads and eliminate the necessity of lubrication and give much longer wear than bonded mounts.

Thomas F. O'Neil, 52, a director of General Tire and brother of its president, died in Miami Beach, Fla., December 10, following an operation.

Seiberling Rubber Co., Akron, announced last month through President J. P. Seiberling that holders of more than two-thirds of the company's prior preference and Class A preferred stocks had consented to the company's plan for issuance of $1,500,000 worth of 4% 15-year sinking fund debentures to finance an expansion in tire making facilities, and that the plan has been declared operative. At the same time Mr. Seiberling revealed that company directors had voted to redeem the 317 shares of Class B preferred stock outstanding and remove the issue from Seiberling's capital structure. Notice of redemption of the Class B preferred stock was mailed December 1 to holders of the stock. Mr. Seiberling said that the company would immediately conclude arrangements of the debenture purchase with the Mutual Life Insurance Co. of New York and proceed with plans for the expansion of tire and tube production facilities at its Barberton, O., plant. He also stated that approximately $1,000,000 would be spent for machinery and equipment and $500,000 for additional manufacturing space required.

Canadian and United States industrial leaders and employes of Seiberling Rubber gathered in Toronto, Ont., Canada, November 27 to honor the octogenarian founders of the company, F. A. and C. W. Seiberling. J. P. Seiberling said in a brief address that the United States would once more turn to the Far East for crude rubber supplies after the war and that crude was superior, more practical and economical than synthetic. In an interview, F. A. Seiberling declared that postwar civilian demand for tires will exceed today's military requirements. He also believes that the cost of tires might be greater owing to a higher standard of living in the Far East after the war.

The Firestone Tire & Rubber Co., Akron, on November 29 from NBC studios began a new radio series, "Voice of Firestone Televues", a pioneer television program, according to President Harvey S. Firestone, Jr.

John W. Thomas, chairman, announced that at a special meeting of the holders of Firestone common stock on December 15 resolutions were adopted amending the articles of incorporation providing for the authorization of $60,000,000 of new preferred stock. The company proposes, under suitable market conditions, to sell sufficient of the new stock, with a dividend rate not to exceed 4½%, to redeem the outstanding 6% preferred stock amounting to $45,600,000. The stockholders also approved a change in the par value of the common stock from $10 to $25 a share.

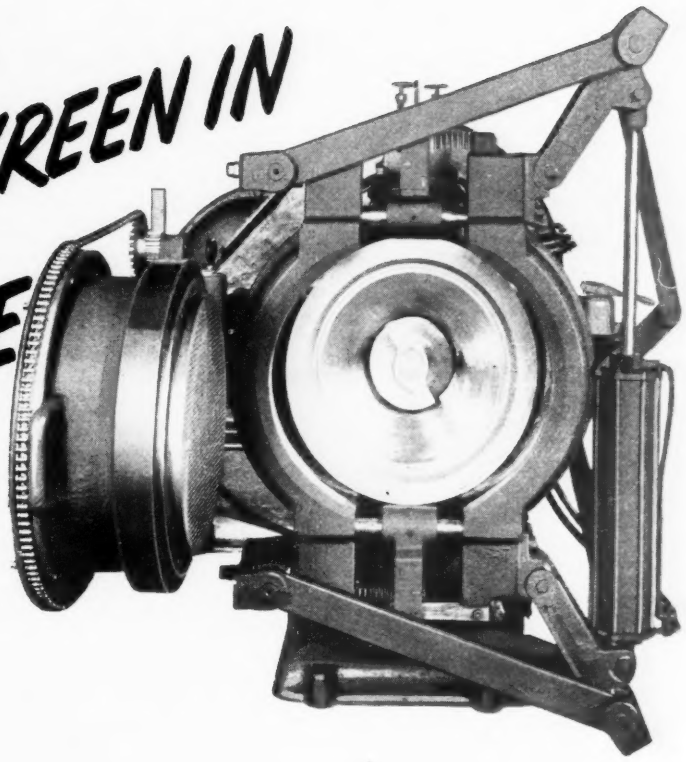
Mary Seagrave Davis Firestone, 28, wife of Lieut. Roger S. Firestone, USNR, president of Firestone Rubber & Latex Products Co., Fall River, Mass., died November 30 in a New York hospital shortly after the birth of a son. Burial took place December 4 in the Firestone family plot at Columbiana, O.

Joseph A. Baty
Technical Director, The C. P. Hall Co., Akron, O.

Workmen Now CHANGE SCREEN IN 1 MINUTE

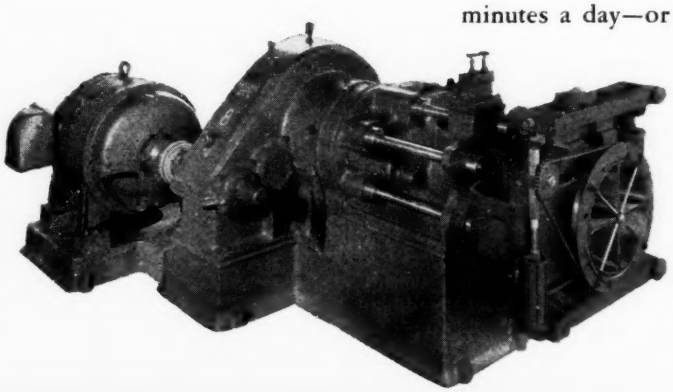
WITH THE

NEW NATIONAL STRAINER



ONE minute or less to change a screen — instead of ten minutes on many older-type strainers!

Based on 24-hour operation and screen changes every half-hour, this new National strainer can actually save you 432 minutes a day—or more than seven hours out of twenty-four!



The small amount of time required for screen change on this machine encourages operators employed on a shift tonnage basis to change screens more frequently, contributes to efficiency of plant operation

National's engineers will be glad to tell you more about this improved strainer head and how it can give you more rubber, quicker.

National Rubber Machinery Co.

GENERAL OFFICES · AKRON, OHIO

Creative Engineering

Goodrich Announcements

Miami, Okla., has been named the site of a new tire manufacturing plant to be built and operated by The B. F. Goodrich Co., Akron. Actual work on the new plant location will soon be started.

B. F. Stauffer, assistant general manager of the Goodrich industrial products sales division, on December 23 was made president and general manager of American Anode, Inc., Akron, a Goodrich subsidiary, to succeed Raymond W. Albright, who resigned to become vice president and general manager of Distillation Products, Inc., Rochester, N. Y. Mr. Stauffer has been with Goodrich 30 years in various capacities.

W. S. Richardson, general manager of the Goodrich chemicals division, has been elected vice president of the Hycar Chemical Co., Akron, it was announced December 31 by Ross W. Thomas, president of Hycar. Mr. Richardson succeeds Raymond W. Albright.

Edward H. Fitch has been named merchandise manager of the combined automotive, aviation, and government sales divisions at Goodrich, it was announced last month by G. E. Brunner, general manager of the three divisions. A graduate of Williams College and the Harvard School of Business Administration, Mr. Fitch joined the company in 1931. After serving nine years in the credit and sales departments of the replacement tire division, he was transferred to his present division on special assignments in 1940 and had been division operations manager since May 1, 1942.

Appointment of H. E. Van Petten as manager of the Goodrich advertising division was announced December 7 by Advertising Director Frank T. Tucker. In his new capacity Mr. Van Petten will direct tire advertising—formerly under the direction of George F. Cozzens, now with the Army—as well as continue in charge of the advertising of the firm's industrial products and Koroseal. Mr. Van Petten has been in the rubber industry for 10 years, all of that time in the advertising field, and has made his headquarters in Akron the last 14 years.

Wallace F. Bowman, plant auditor and office manager of the Clarksville, Tenn., Goodrich factory, has been appointed departmental auditor in Akron, according to Controller T. B. Tomkinson.

A "self-starting" airplane tire that will attain high rolling speed before it touches ground, easing the wear and tear of landing impact, was announced December 10 by Henry F. Schipped, Goodrich tire engineer and inventor of the device. The pre-landing rotation requires no motor, being achieved simply by a unique arrangement of vanes, or fins, built into the sidewall of the tire so that when the landing gear is lowered they catch the air and thus set the wheel spinning. The fins, of rubber and fabric, are so constructed and placed that they spring back into position flush with the tire's side, on the "upper half" of each rotation of the wheel. The effectiveness of this mode of "starting 'em rolling" in lessening airplane tire wear has been convincingly demonstrated in tests, according to James S. Peller, manager of Goodrich's aeronautical division.

Goodrich is now making landing gear struts for fighter planes in its recently established metal products division.

John J. McDermott, Goodrich sales production manager, on December 9 addressed the commercial vehicle section of the Greater New York Safety Council at the Hotel George Washington on the critical civilian truck tire situation.

B. F. Stauffer

H. E. Van Petten

Timken Announcements

The Timken Roller Bearing Co., Canton 6, has named Donald S. Klippert assistant general manager of sales of the Timken steel and tube division. He had been Cleveland district manager of the division, a post now held by Robert P. Donnell, division metallurgical engineer specializing in aircraft applications for the past six years. Mr. Klippert has been associated with the Timken company for eight years, having spent four in Milwaukee and Chicago, in addition to four years as manager of the Cleveland district. Mr. Donnell served two years as chief metallurgist of the White Motor Car Co., Cleveland, and for six years prior to that was in charge of metallurgy for the Lycoming division of Aviation Mfg. Corp.

Timken last month also appointed Paul Reeves advertising manager to succeed Roland P. Kelley, who after 17 years as such resigned to go into advertising agency work. Mr. Reeves is a native of Dover, O., attended Staunton Military Academy, and is a graduate of Carnegie Institute of Technology with a degree in mechanical engineering. He came to Timken in 1929 and after completing the engineering training course served as sales engineer in the Chicago office, was subsequently transferred to the Pacific Coast to become industrial district manager of the company's San Francisco branch, and in 1940 was brought back to Canton as sales promotion manager. When this country entered the war, Mr. Reeves was put in charge of government priorities to handle contacts between the company and Washington.

Ralph L. Wilson, former chief of the constructional steels section of the Metallurgical and Conservation Branch, Steel Division, WPB, Washington, D. C., became chief metallurgical engineer of the Timken company, January 1. His experience includes six years with the metallurgical departments of the United Alloy Steel Corp. and Central Alloy Steel Corp., after which he was for ten years employed by the steel and tube division of Timken as metallurgical engineer, specializing in alloy steel tubing applications in the various process industries.

According to a recent announcement by Timken, which manufactures graphitic and alloy steels, The Peninsular Steel Co., Cleveland, will expand its activity in Ohio for the distribution of graphitic tool steels. The added territory will include Dayton and Cincinnati, formerly covered by Quality Steels, Inc., Dayton, and Frederick Steel Co., Cincinnati.

Goodyear News

The Goodyear Tire & Rubber Co., Akron, recently transferred C. W. Thorp from the managership of the Portland, Oreg., branch to that of the Sacramento, Calif., branch. His successor at Portland is G. B. Newman, who has been with the company since 1929 in various sales capacities. Mr. Thorp joined the company in 1923.

Charles C. Corne, former manager of the tire, battery, accessories and service station operations for National Refining Co., Cleveland, has joined the Goodyear Retail Stores Division where he will be in charge of the buying and marketing of petroleum products, anti-freeze, and similar goods.

Use of synthetic rubber for gasoline-absorbent "overcoats" on bullet-sealing fuel tanks in warplane wings was disclosed December 7 by the Goodyear company. Large quantities of Airfoam are now being supplied several airplane manufacturers for the lightweight "overcoats", according to W. C. Winings, manager of Goodyear's mechanical goods division. The "overcoats" can absorb any slight amount of gasoline which may escape from a fuel tank after it is pierced by a bullet and before the hole seals itself. Prior to adoption of the synthetic rubber "overcoats" these slight amounts of escaping fuel tended to form highly explosive air mixtures within warplane wings, owing to the fuel's high volatility.

Wartime developments in the rubber industry with definite postwar possibilities were outlined recently for district managers of Goodyear's mechanical goods divisions who gathered in Akron from all over the country. Among the speakers were Mr. Winings, E. W. Stephens, manager of the conveyor belt department, R. W. Sanborn, head of the hose department, and Joseph F. Taylor, head of the V-belt department.

Goodyear held its annual Christmas party for the children of its employes at Goodyear Hall on December 22.

D. R. Mackenroth, general manager of Goodyear's retail stores division, on Decem-

PERBUNAN

WHEN IT'S COLD...

PERBUNAN

Even at extremely low temperatures, this oil-resistant synthetic rubber stays flexible and holds a firm seal. A good reason why Perbunan has replaced metal in gasoline and hydraulic oil "plumbing" installations in United States aircraft being built today.

Write STANCO DISTRIBUTORS, INC., 26 Broadway, New York City

WAREHOUSE STOCKS IN NEW JERSEY, LOUISIANA AND CALIFORNIA

ber 2 addressed the oil industry's tire, battery, and accessory group conference at Excelsior Springs, Mo. His subject was "Retail Merchandising through Service Stations."

Mrs. Julia Weeks Litchfield, 92, mother of Paul W. Litchfield, Goodyear board chairman, died at her son's home in Akron on December 5.

OBITUARY

Frank S. Reitzel

FOLLOWING a long illness, on Christmas Day died in Swarthmore, Pa., Frank Strayer Reitzel, comptroller, director, and assistant to the president of Sun Oil Co., Philadelphia 3, Pa., with which he had been associated a quarter century. The deceased was also a director of the Sun Shipbuilding & Dry Dock Co., the Houdry Corp., and the Swarthmore National Bank & Trust Co.

Mr. Reitzel, who was born in Steelton, Pa., 70 years ago, began working at 16 for the Pennsylvania Steel Co. He remained with the steel industry 22 years. Then, however, he became treasurer of the Sun Shipbuilding company and joined the oil concern after World War I.

He was a member of the American Petroleum Institute, the Union League, and the Rolling Green Golf Club, a past president of the Swarthmore Borough Council, and an elder of the Swarthmore Presbyterian Church.

Funeral services were conducted December 29 at the Presbyterian Church.

Survivors include the widow, a son, two grandsons, and a brother.

Max Loewenthal

A HEART ailment recently caused the death of Max Loewenthal, 81, former chairman of the board of U. S. Rubber Reclaiming Co., Inc., New York, N. Y. Born in Schwerin, Germany, March 29, 1862, Mr. Loewenthal was educated at state common and high schools there, graduating in 1879. He had been employed by firms in Amsterdam, Holland, and Hamburg until 1884, when he came to America and entered the employ of B. Loewenthal & Co., Chicago, Ill. Then he went on to Loewenthal & Morganstern, as assistant secretary. In 1895, with the late Theodore S. Bassett, he founded U. S. Rubber Reclaiming Co., Buffalo, N. Y., of which he was treasurer until 1909, then vice president until 1919, then president until 1924, and then chairman of the board. Also he was a director in the Crossways Realty Corp. and the Fleischman Realty & Construction Co.

The deceased was philanthropically active in the United Hebrew Charities of New York City, having organized the industrial department and having also served as chairman. The Harmonie, the North Shore Country, and the Norwood Golf clubs and the Rubber Association of American claimed his membership as well.

Funeral services were held in Beverly Hills, Calif.

Mr. Loewenthal's wife, two daughters, and four grandchildren survive him.

MIDWEST

Ideas and Inventions Wanted

Your government wants your ideas and inventions which will help win the war. Smaller War Plants Corp., through the Technical Development Section, is set up to handle these new inventions and ideas. Already they have handled hundreds of new developments and devices, and many have already gone to the "front" in the services of our Armed Forces. Many others have stayed on the home front to help boost civilian morale.

One simple invention might shorten the war by months. Another might save thousands of lives!

If any reader of INDIA RUBBER WORLD has an invention or idea that will help your government, we urge you to contact immediately: Smaller War Plants Corp., Technical Development Section, 226 W. Jackson Blvd., Chicago 6, Ill.

Lake Shore Tire & Rubber Co., E. 24th and Scott Sts., Des Moines 6, Iowa, has appointed Alan Wood Schoeller general purchasing agent.

Chicago Drug & Chemical Association held its forty-first annual Christmas banquet at The Drake, Chicago, Ill., December 16. There was a Christmas present for everyone, and door prizes also were distributed.

NEW ENGLAND

The American Resinous Products Corp., Peabody, Mass., has announced the appointment of Burt Wetherbee as technical service manager, and he will take over his new duties on February 1. Mr. Wetherbee is well known in the rubber trade, particularly in the East, and has been associated with the Globe Woven Belting Co., Buffalo, N. Y., since 1936 as manager of research. He was one of the organizers of the Buffalo Rubber Group and has been very active in it, holding several offices, including the chairmanship in 1942. He is also a member of the Society of Automotive Engineers, American Institute of Chemists, American Chemical Society, American Association of the Advancement of Science, and others. He holds degrees from Tufts College and the University of Florida. Mr. Wetherbee's present home is in Snyder, N. Y., but after February 1, he will probably be located in either Chicago or Detroit.

Beach

Burt Wetherbee

Sponge Rubber Products Co., Derby, Conn., has appointed H. S. Boyle sales promotion manager of all products.

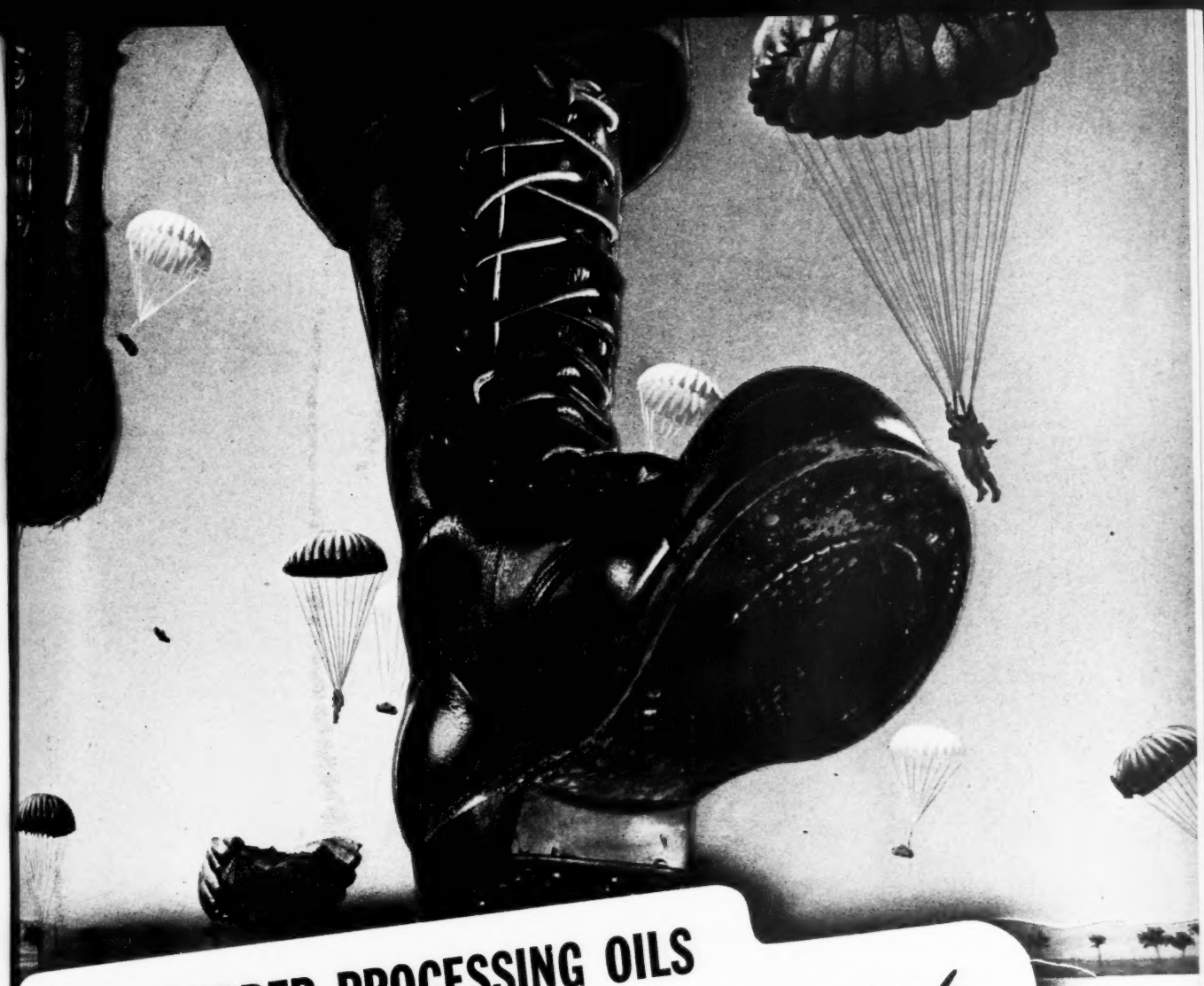
Alfred Hale Rubber Co., North Quincy, Mass., following the recent death of David A. Cutler, president and treasurer, named David R. Cutler president, A. Cushing Cutler, treasurer, and Richard H. Sherman, works manager.

Russell Mfg. Co., Middletown, Conn., has resumed production, halted by the war, on full scale of rubberized belting for high-speed machines. The concern, however, is using synthetic rubber and has developed newer methods for combining it with an improved fabric. Russell, according to Peter F. Madsen, belting sales manager, is also conducting tests of belting made from synthetic leather, "trolene-ized" leather, a recent development of the company.

Benjamin J. Lazan, chief engineer and vice president of Sonntag Scientific Corp., Greenwich, Conn., an affiliate of The Baldwin Locomotive Works, Philadelphia, Pa., was awarded the Alfred Noble Prize for 1943 for the most outstanding research work in any field of engineering. The prize was given him for his paper on "Some Mechanical Properties of Plastics and Metals under Sustained Vibrations." Presentation took place December 1 at the annual dinner of the American Society of Mechanical Engineers at the Hotel Pennsylvania, New York, N. Y. Other organizations participating in the award were the American Society of Civil Engineers, the American Institute of Mining & Metallurgical Engineers, the American Institute of Electrical Engineers, and the Western Society of Engineers.

PACIFIC COAST

Exchange Byproducts Co., Ontario, Calif., has developed pectate pulp, a citrus by-product, for use as an anti-stick compound to coat the containers in which synthetic rubber is stored or shipped, for the adhesive qualities of synthetic rubber necessitates some precaution against sticking to the package. Previously clay or hard varnish coatings had been used, but the clay is dirty, and the varnish expensive. The new product is said to be cheap and plentiful.



SUN RUBBER PROCESSING OILS

Puts the "Tack" in rubber for attack

Provide Required "Tack" for Army Soles and Heels . . . at a 10% Saving!

An Army fights on its *feet!* So rubber soles and heels for the shoes of our fighting men must be *right* . . . and government "specs" must be exacting. For one thing, a certain amount of "tack" is desired in the rubber stocks used in these compounds.

Not satisfied with the softening qualities of the plasticizer being used in pan reclaiming, one manufacturer of government soles and heels changed to another oil. Softening was improved but the required "tack" was lacking. A Sun Engineer was called in. He recommended that Sun Rubber Processing Oil be tried.

Both "tack" and softening qualities were greatly improved, right from the start. In eight months, results have continued to be entirely satisfactory.

A "plus" advantage has also been realized in a 10% saving in quantity of plasticizer required.

As a result of this favorable experience, the use of Sun Rubber Processing Oils has been extended to the alkali digester reclaiming process in this plant . . . with equally good results.

The experience of the Sun Rubber Processing Engineer is at your disposal, just for the asking. Write to

SUN OIL COMPANY · **Philadelphia 3, Pa.**
Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS HELPING INDUSTRY HELP AMERICA

New Plant of Los Angeles Standard Rubber, Inc.

Los Angeles Standard Rubber, Inc.'s new manufacturing plant at 1500 E. Gage Ave., Los Angeles, Calif., was completed last month. The new brick building, covering an area of 35,000 square feet, houses some of the most modern rubber manufacturing equipment in the West, including an up-to-date laboratory for testing synthetic and natural rubber products to the industrial user's specifications. Supervision of the company's several branches throughout Los Angeles will be directed from the new plant. Los Angeles Standard Rubber, Inc., specializes in the manufacture of "Controlled Rubber", the identification for rubber products compounded to accurate formulae and formed to exact specifications, under constant laboratory control.

CANADA

Polymer Corp. plant at Sarnia, Ont., was inspected December 14 by about 30 members of the operating and compounding committees of Rubber Reserve Co., Washington, D. C., U. S. A., including W. F. Palmer, chairman of the operating committee, and R. Hucks, its secretary, Norman Shepard, director of polymerization research in the Office of the Rubber Director, and J. Elgin, chairman of the process development division of the ORD. Acting as hosts to the American delegation were John R. Nicholson, general manager of Polymer Corp., and E. R. Rowzee, manager of Canadian Synthetic Rubber Co. After luncheon speeches were made comparing operations at Sarnia with those of similar plants in the United States, and suggestions were offered as to the adaptation of the best practices in various plants.

R. C. Berkinshaw, president, Polymer Corp., Sarnia, Ont., on December 6 informed the Automotive Transport Association at a meeting in Toronto that the scarcity of automobile tires will continue for about a year and a half or two years. He also considered synthetic rubber tires. Price, he added, is an important factor in the postwar position of synthetic tires as compared with those of natural rubber.

George B. Sawin, head of The B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont., also recently discussed the present position of crude rubber and the current tire shortage. He predicts an even greater shortage in North America in 1944 and in consequence stresses tire conservation. Mr. Sawin likewise mentioned the shortcomings of synthetic rubber tires in comparison with those of the natural product.

Dominion Rubber Co., Ltd., Montreal, P. Q., recently moved its Toronto, Ont., warehouse to more modern quarters at 672 Dupont St.

The Dominion Bureau of Statistics, Ottawa, Ont., reported that the Canadian rubber industry during 1942 showed a value of production $3,093,020 higher than in 1941. Gross selling value of all products in 1942 was $122,231,402, compared with $119,137,770 the year before. Tires and tubes accounted for $60,831,055 of the '42 figure, footwear $19,858,505, and miscellaneous rubber goods $35,541,782.

Fairmont Co., Ltd., government rubber purchasing agency, Toronto, Ont., because sufficient old tires and tubes have been assembled to meet its needs, on January 15 discontinued payment of freight on shipments of tires and tubes. The company, however, will continue to pay the same prices as at present for such merchandise, but shippers must pay the freight charges. Fairmont yards are at Toronto and Montreal, P. Q.

FINANCIAL

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. Nine months to September 30, 1943: net profit, $531,271, or 40¢ a share, against $689,667, or 64¢ a common share, in the corresponding period of the previous year; taxes, $531,805, against $965,780.

Armstrong Rubber Co., West Haven, Conn. Year ended September 30, 1943: net income, $451,582, against $380,558 in the preceding 12 months; taxes, $314,772, against $198,256.

Flintkote Co., New York, N. Y., and subsidiaries. Forty weeks to October 9: net income, $1,024,080, equal, after preferred dividends, to $1.04 each on 713,706 common shares, compared with $1,115,900, or $1.37 a share, in the corresponding period last year; taxes, $1,362,205, against $3,078,878.

General Motors Corp., Detroit, Mich. Nine months ended September 30, 1943: net profit, $109,519,455, equal to $2.36 a common share, against $83,562,119, or $1.76 a share, in the same months last year; provision for taxes, $171,273,000, against $87,824,000; net sales, $2,699,071,478, a record, against $1,503,880,455.

Master Tire & Rubber Corp., Findlay, O. First nine months, 1943: net income, $241,048, against $78,647 in the like period of 1942.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. First nine months, 1943: net profit, $1,279,239, equal to $2.09 a share, against $1,268,924, or $2.02 a share, in the corresponding period of the previous year; federal taxes, $5,005,000, against $5,127,000.

Rome Cable Corp., Rome, N. Y. Six months ended September 30, 1943: net profit, $301,043, or $1.58 a share, against $117,518, or 61¢ a share, in the like period of 1942.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. First nine months, 1943: net profit, $527,057, or $1.77 a share, against $375,550, or $1.20 a share, in the 1942 period; taxes, $1,593,723, against $891,674.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$0.25	Dec. 21	Dec. 10
American Hard Rubber Co.	Pfd.	1.75 q.	Dec. 21	Dec. 10
American Wringer Co.	Com.	0.45 yr.-end	Dec. 20	Dec. 10
Anaconda Wire & Cable Co.	Com.	0.25	Dec. 20	Dec. 10
Baldwin Rubber Co.	Com.	0.125	Jan. 21	Jan. 15
Collyer Insulated Wire Co.	Com.	0.50	Jan. 3	Dec. 24
Crown Cork International Corp.	A	0.20 accum.	Dec. 30	Dec. 20
Detroit Gasket & Mfg. Co.	Com.	0.25	Jan. 25	Jan. 8
Dewey & Almy Chemical Corp.	Com.	0.25 q.	Dec. 15	Dec. 4
Dewey & Almy Chemical Corp.	B	0.25 q.	Dec. 15	Dec. 4
Dunlop Tire & Rubber Goods Co., Ltd.	Com.	0.50 yr.-end	Dec. 21	Dec. 15
Dunlop Tire & Rubber Goods Co., Ltd.	Pfd.	0.625 s.	Dec. 31	Dec. 16
E. I. du Pont de Nemours & Co., Inc.	Pfd.	1.125	Jan. 25	Jan. 10
E. I. du Pont de Nemours & Co., Inc.	Com.	1.25 yr.-end	Dec. 14	Nov. 22
Electric Storage Battery Co.	Com.	0.50	Dec. 21	Dec. 1
Firestone Tire & Rubber Co.	Com.	0.375	Jan. 20	Jan. 5
Flintkote Co.	Pfd.	1.125 q.	Dec. 15	Dec. 10
Flintkote Co.	Com.	0.25	Dec. 15	Dec. 10
Garlock Packing Co.	Com.	0.50	Dec. 28	Dec. 18
General Electric Co.	Com.	0.35	Jan. 25	Dec. 28
Goodyear Tire & Rubber Co. of Canada, Ltd.	5% Pfd.	0.50	Dec. 31	Dec. 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	0.63 q.	Dec. 31	Dec. 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00 extra	Dec. 31	Dec. 15
Hercules Powder Co.	Com.	1.00 yr.-end	Dec. 21	Dec. 10
Hewitt Rubber Corp.	Com.	0.25	Dec. 15	Dec. 1
Jenkins Bros.	Com.	0.50 yr.-end	Dec. 29	Dec. 17
Jenkins Bros.	Pfd.	2.00 yr.-end	Dec. 29	Dec. 17
Jenkins Bros.	Pfd.	1.75 q.	Dec. 29	Dec. 17
Mansfield Tire & Rubber Co.	No	0.25 q.	Dec. 20	Dec. 10
Midwest Rubber Reclaiming Co.	Pfd.	1.00 q.	Jan. 1	Nov. 20
Okonite Co.	Com.	0.50 extra	Feb. 1	Jan. 17
Okonite Co.	Com.	1.50 q.	Feb. 1	Jan. 17
Rome Cable Corp.	Com.	0.15 yr.-end	Dec. 30	Dec. 9
Seiberling Rubber Co.	Com.	0.25 yr.-end	Jan. 1	Dec. 15
Thermoid Co.	Com.	0.10 q.	Dec. 15	Dec. 3
Thermoid Co.	Com.	0.15 extra	Dec. 15	Dec. 3
Thermoid Co.	$3 Pfd.	0.75 q.	Dec. 15	Dec. 3

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Synthetic Resinous
PLASTICIZERS
and EXTENDERS
for GR-S and other
Synthetic Rubbers

★

—Decrease Milling Time

—Improve Tear Resistance

—Impart High Tensile Strength

LITERATURE AND SAMPLES AVAILABLE

AMERICAN ALKYD INDUSTRIES, INC.

CARLSTADT, N. J.

Patents and Trade Marks

PROCESS

United States

2,335,190. Production of a Laminated Product, Which Includes Heating an Elongated Film-Like Formation of Rubber Hydrochloride Material, and Stretching, Overlapping and Uniting Adjacent Overlapped Portions into a Thread-Like Product While Heated, and Cooling the Product While Stretched. H. D. Mimich, North Tarrytown, N. Y.

2,335,191. Covering an Elongated Object, Such as a Thread Core, with a Thin Covering of Sheet Material, Such as Rubber Hydrochloride. H. D. Mimich, North Tarrytown, N. Y.

2,335,321. Manufacture of Sheer Hosiery by Immersing Treated Hose into an Aqueous Dispersion of Resilient, Solid, High-Molecular Weight Polymer of Isobutylene, a Rubber and a Phenol-Formaldehyde Resin. A. Szegvari, Fairlawn, and A. H. Feikert, both of Wadsworth, assignors to American Anode, Inc., Akron, all in O.

2,336,149. Manufacture of V-belts by Introducing a Rubberized Fabric Layer into a Composition of Rubber Reenforced with Fine Textile Fibers to Form a Strip to Be Wound around a Mandrel, and Laying thereover a Plurality of Straight-Laid Square Woven Plies of Rubberized Fabric. A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.

2,336,944. Production of Compact and Non-Porous Rubber Sheeting from Frothed Aqueous Dispersions of Rubber and the Like, Which Comprises Applying the Frothed Aqueous Rubber Dispersions Substantially Uniformly to a Backing Surface, Setting the Froth to a Spongy or Cellular Structure of Irreversible Material, Compacting the Spongy or Cellular Structure by Pressure to Collapse the Foam and Further to Reduce Its Thickness While the Material Is Still Wet, and Drying the Thus Compacted and Non-Porous Rubber Sheeting. E. W. Madge, Sutton Coldfield, and F. T. Purkis, Moseley, Birmingham, assignors to Dunlop Rubber Co., Ltd., London Co., all in England.

United Kingdom

555,070. Repairing Rubber Articles Such as Pneumatic Tires. Dunlop Rubber Co., Ltd., F. G. W. King, and D. Bulgin.

555,183. Asbestos Fabric. United States Rubber Co.

555,643. Regeneration of Waste Rubber. North British Rubber Co., Ltd., and A. Johnston.

555,680. Retreading and Repairing Pneumatic Tires. S. A. Wright.

555,690. Retreading Pneumatic Tires. S. A. Wright.

APPLICATION

United States

2,334,990. Pneumatic Life Preserver Belt Including a Pneumatic Tube Foldable along a Longitudinal Median Line, Securing Means, and an Inflating Tube. E. C. Craig and L. A. Straits, both of the United States Navy.

2,334,990. Electric Lamp of the Incandescent Filament Type Having Sealed Envelope and a Resilient Rubber Cover Closely Fitting and Resiliently Gripping the Envelope. N. W. Bosten and M. Solomon, both of Los Angeles, Cal.

2,334,963. Laminating Machine Including a Relatively Large Rubber Covered Roller. I. Spinner and C. B. Nelson, both of Chicago, Ill., and G. Schieman, New York, N. Y., assignors to International Plastic Corp., Chicago, Ill.

2,335,203. Rubber Article Including a Member Formed of Rubber Material Having a Seam Therein and a Sealing Layer of Rubber Material Exteriorly Covering the Seam and Adjacent Surface Portions of the Member. G. L. Winder, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

2,335,204. A Blood Pressure Bag or Similar Article Formed of Rubber and Including a Hollow Bag Portion of Generally Rectangular Flat Configuration, a Plurality of Communicating Tubes and a Reenforcing Element Attached to the Interior Wall of the Bag. G. L. Winder, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

2,335,258. Hydraulically Operated Vise Assembly Having Two Parallel Vise Jaws, a Series of Combined Plungers and Vise Jaws Adapted to Be Slidably Mounted in Pairs, and a Cup Shaped Resilient Packing Rubber Adjacent Each Inward or Plunger End of Each of the Combined Plunger and Vise Jaws. F. D. Butler, United States Navy.

2,335,594. Feed Roll for a Rotary Whole Kernel Green Corn Cutter Including a Spool-Shaped Body Having a Plurality of Stubby Ribs of Soft Elastic Material Such as Rubber, Defined by Grooves in the Surface of the Body. C. F. Kerr, Hoopeston, Ill., assignor to Food Machinery Corp., San Jose, Calif.

2,335,924. Sack Pickup Including a Roller Having a Periphery Formed of Rubber and Provided with a Gripping Tread. R. H. Elholm, Custine, Calif.

2,336,669. Earphone Support and Silencer Cup of Flexible, Rubber-like Material Including a Cavity Portion to Receive an Earphone. R. W. Brown and R. Iredell, assignors to General Tire & Rubber Co., all of Akron, O.

2,336,878. Resilient Tire. H. McIntyre, Kirkland Lake, Ont., Canada.

2,336,885. Fitting Construction for Liquid Fuel or Lubricant Tanks Including a Tank Cell Formed of One or More Layers of Rubber-Like Material Subject to Cold Flow and Having an Opening through the Wall thereof. F. J. Pepersack, Towson, assignor to Glenn L. Martin Co., Middle River, both in Md.

Dominion of Canada

416,038. Truck Structure Having a Main Frame, a Secondary Frame, a Torsion Spring with a Tubular Rubber Torsion Element Secured to Inner and Outer Members. Transit Research Corp, assignee of E. H. Piron, both of New York, N. Y., U. S. A.

416,580. Dry Cell Having a Sharp Upstanding Peripheral Edge and a Rubber Gasket of Substantial Thickness and Some Porosity Engaging the Peripheral Edge. General Dry Batteries of Canada, Ltd., Toronto, Ont., assignee of C. P. Deibel, Cleveland, O., U. S. A.

416,581. Dry Cell Battery Unit Having an Outer Metal Casing, a Plurality of Small Wafer-Like Dry Cells Arranged within the Casing, and a Rubber Jacket Enclosing Each Cell. General Dry Batteries of Canada, Ltd., Toronto, Ont., assignee of C. P. Deibel and L. A. Gray, co-inventors, both of Cleveland, O., U. S. A.

416,628. Stretchable Artificial Substitute for Patent Leather Including a Laminated Elastic Sheet Having Rubber Threads to Provide the Desired Elasticity. United States Rubber Co., New York, assignee of E. F. Roberts, Rye, both in N. Y., U. S. A.

United Kingdom

556,924. Inner Tubes. Wingfoot Corp.

CHEMICAL

United States

2,335,059. Vulcanizing Rubber by Heating It and Sulphur in the Presence of an N,N Dialkyl Cyclohexylamine Salt of an Organic Carboxylic Acid Selected from the Group Consisting of Higher Fatty Acids Containing at Least Ten Carbon Atoms and Aromatic Carboxylic Acids. M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

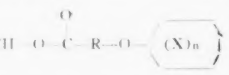
2,335,089. Preserving a Rubber by Treating It with a Nuclear Substituted Catechol. R. L. Sibley, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,335,104. A "Self-Setting" Flexible Adhesive Compounded Essentially of a Mixture of Concentrated Aqueous Dispersions of Vulcanized and Unvulcanized Rubber Latices. K. W. Britt, Norwood, and W. S. Corbin, Ridley Park, assignors to Scott Paper Co., Chester, all in Pa.

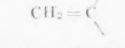
2,335,124. Aqueous Emulsions of Products of the Conjoint Polymerization of Butadiene-1,3 and Styrene in Aqueous Emulsion; the Styrene Content of the Polymeric Product Is between about 47.5% and 70%; the Polymeric Product Is Soluble in Benzene without Being Subjected to a Breaking Down Process. E. Konrad and R. Ludwig, both of Leverkusen-I.G.-Werk, Germany; vested in the Alien Property Custodian.

2,335,454. Production of Polymerization Products by Heating an N-Vinyl Lactam with a Polymerization Catalyst Capable of Supplying Oxygen under the Reaction Conditions and Selected from the Class Consisting of Inorganic Peroxides and Organic Peroxides. C. Schuster, R. Sauerbier, and H. Fikentscher, all of Ludwigshafen-on-the-Rhine, Germany; vested in the Alien Property Custodian.

2,335,651. A Composition Comprising the Product of Polymerization of Ingredients Comprising (1) a Vinyl Ester of a Halo-Phenoxy Substituted Aliphatic Monocarboxylic Acid Having the Structural Formula

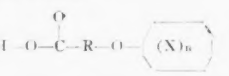


Wherein R is a Divalent Saturated Aliphatic Hydrocarbon Radical, X a Halogen Selected from the Class Consisting of Chlorine and Bromine, and n an Integer at Least One and Not More than Five; and (2) a Compound Containing at Least One Polymerizable



Grouping Selected from the Class Consisting of Vinyl Hydrocarbons, Vinyl Halo-Hydrocarbons, Vinyl Halides, Vinylidene Halides, Vinyl Ethers, Acrylic Nitrile, Alpha-Alkyl Substituted Acrylic Nitriles, Acrylic Esters of Saturated Alcohols, Alpha-Alkyl Substituted Acrylic Esters of Saturated Alcohols, Alpha-Halo Substituted Acrylic Esters of Saturated Alcohols, Vinyl Alcohol Esters, and Allyl Alcohol Esters. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., a corporation of New York.

2,335,652. Chemical Compounds Corresponding to the General Formula

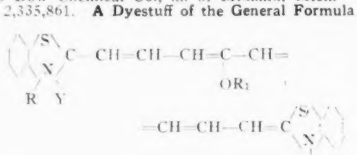


Where R Is a Divalent Aliphatic Hydrocarbon Radical, X a Halogen Selected from the Class Consisting of Chlorine and Bromine, and n an Integer at Least One and Not More than Five. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., a corporation of New York.

2,335,730. Producing Sponge Rubber by Heating Rubber and Sulphur in the Presence of a Trisubstituted Pentazdiene Having an Aryl Radical Attached to Each of the Two Terminal Nitrogen Atoms of the Five Nitrogen Chain and an Organic Radical on the Nitrogen Atom in the Middle or 3 Position; the Proportion of Pentazdiene Is Sufficient to Produce a Sponge Rubber Product of Uniform Pore Size and Fine Texture. E. S. Blake, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,335,845. 2—Alkoxy-3,5-Dichloro-Diphenyl. G. H. Coleman and W. D. Schroeder, assignors to Dow Chemical Co., all of Midland, Mich.

2,335,861. A Dyestuff of the General Formula:



Wherein Y Is the Negative Radical of an Acid, R a Group Selected from the Group Consisting of Alkyl and Aralkyl Groups, and R_1 an Alkyl Group. J. D. Kendall, assignor to Ilford, Ltd., both of Ilford, England.

2,335,912. Production of Terpene Resin by Polymerization Catalytically Induced by Means of a Polymerization Catalyst Which Is the Halide of a Polyvalent Metal and Which Is Capable of Being Hydrolyzed by Water to Give an Acid Reaction with Agitation and under Heat-Abstracting Conditions in a Turpentine Starting Liquid Consisting in Substantial Entirety of Beta-Pinene. S. G. Burroughs, Pittsburgh, Pa., assignor to Pennsylvania Industrial Chemical Corp., a corporation of Pa.

2,335,986. Phonograph Record Comprising a Vinyl Resin Base, Composed of a Conjoint Polymer of a Vinyl Halide with a Vinyl Ester of an Aliphatic Acid, and a Mixed Filler in an Amount at Least about Equal by Weight to the Vinyl Resin; the Mixed Filler Contains a Substantial Proportion Each of Finely Divided Charcoal of Vegetable Origin and Finely Divided Inorganic Abrasive Material Having a Hardness of at Least 5 on Mohs' Scale. V. Yngve, Lakewood, O., assignor to Carbide & Carbon Chemicals Corp., a corporation of New York.

2,336,208. Heating a Hydrocarbon Compound Containing Two Conjugated C = C Double Linkages with a Vinyl Ester of Organic Acids; the Reaction Is Performed under Such Conditions as to Prevent Any Substantial Polymerization. K. Alder, Cologne-Deutz, and H. F. Rickert, Cologne-on-the-Rhine, both in Germany; vested in the Alien Property Custodian.

2,336,217. Vulcanization of Rubber Which Includes Incorporating into Rubber, Sulphur and a Vulcanization Accelerator Comprising a Mono-

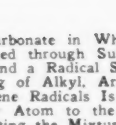
Twenty-Fifth Anniversary

1919-1944

AKRON, OHIO • LOS ANGELES, CALIF. • CHICAGO, ILL.

Thiazyl Dithiocarbonate in Which the Thiazyl Radical Is Linked through Sulphur to a Carbonyl Radical, and a Radical Selected from the Group Consisting of Alkyl, Aralkyl, Aryl, Alicyclic and Terpene Radicals Is Linked through Another Sulphur Atom to the Same Carbonyl Group, and Heating the Mixture. E. S. Blake, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,336,230. Derivatives of Phosphonic Acid Having the Structural Formula



Wherein R and R' Are Substituents Selected from the Group Consisting of Hydrogen, Alkyl, Aryl, Naphthenyl, and Alkaryl. J. B. Dickey and A. Loria, assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,336,259. Process for Inactivating Styrene Polymerization Inhibitors in an Impure Styrene Oil Containing Inhibitors of the Acetylenic Type. W. A. King, Memphis, Tenn., I. H. Kleiner, Atlantic City, N. J., and A. R. Krotzer, Philadelphia, Pa., assignors, by mesne assignments, to Allied Chemical & Dye Corp., a corporation of New York.

2,336,388. Bonding to the Surface of Aluminum Articles a Plastic Selected from the Class Consisting of Rubber, Vulcanized Rubber, Chlorinated Rubber, Rubber Hydrochloride, Polymerized Chlorobutadienes and Butadiene Copolymers. M. C. Beebe, Mt. Carmel, Conn., assignor to Scovill Mfg. Co., Waterbury, Conn.

2,336,672. Preparation of a Thermosetting Resin Composition. W. R. Collings, R. D. Freeman, and R. M. Upright, assignors to Dow Chemical Co., all of Midland, Mich.

2,336,792. Article Having a Rubber Surface with an Adherent Top Coating Consisting of a Dried Film of a Coating Composition, the Film-Forming Material of Which Consists Essentially of a Mixture of Vinyl Resin and a Phenol-Aldehyde Resin. C. M. Langkammerer, Wilmington, Del., and W. S. Gocher, Fairfield, and A. J. Jennings, Bridgeport, both in Conn., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Dominion of Canada

416,106. Composition Comprising an Alkyl Ester of Methacrylic Acid Copolymerized with an Alpha Aryl Substituted Allyl Methacrylate, in Which the Aryl Substituent Is a Triphenyl Phenyl Group. Canadian Industries, Ltd., Montreal, P. Q., assignee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of Norton Co., assignee of C. E. Barnes, both of Worcester, Mass., both in the U. S. A.

416,107. Alpha Triphenyl Phenyl Substituted Allyl Methacrylate. Canadian Industries, Ltd., Montreal, P. Q., assignee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of Norton Co., Worcester, Mass., assignee of C. E. Barnes, Belvidere, N. J., all in the U. S. A.

416,108. Polymerized Substance Comprising the Product of Polymerization of a Plurality of Polymerizable Materials Including an Ester of a Monhydric Alcohol and an Acid Selected from the Group of the Acrylic and Methacrylic Acids Copolymerized with a Substance Selected from the Group Consisting of Styrene and the Nitro-Styrenes and with an Ester of the Hypothetical Ethylidene Glycol and One of the Acids. Canadian Industries, Ltd., Montreal, P. Q., assignee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of Norton Co., Worcester, assignee of L. Coes, Jr., Brookfield, both in Mass., both in the U. S. A.

416,150. Flowable Aqueous Solution Containing Polyvinyl Alcohol, a Wax, a Plasticizer, and a Basic Soluble Blending Agent Comprising a Modified Rosin. E. I. du Pont de Nemours & Co., Inc., assignee of F. M. Meigs, both of Wilmington, Del., U. S. A.

416,165. Incorporating Polymerized Aliphatic Monoolefins in Polymerized Styrene by Dissolving the Polymerized Aliphatic Monoolefin in Monomeric Styrene and Then Polymerizing the Styrene. International Standard Electric Corp., New York, N. Y., U. S. A., assignee of T. R. Scott and M. C. Field, co-inventors, both of London, England.

416,207. Rendering Aggregates of a Di(Arylenethiazyl) Disulphide Prepared by Oxidizing a 2-Mercaptoarylenethiazole by Means of Nitrous Acid Susceptible to Disaggregation on Mechanical Working with Rubber, Which Comprises Treating the Aggregates with an Oily Material. Wingfoot Corp., Wilmington, Del., assignee of C. H. Smith, Talmadge, and A. J. Gracia, Cuyahoga Falls, both in O., all in the U. S. A.

416,290. Coloring Normally Crystalline Vinylidene Chloride Polymers by Providing a Supercooled Form of Such Polymer and Bringing It into Contact with a Coloring Agent Dispersed in a Volatile Organic Liquid Which Wets the Surface of the Polymer. Dow Chemical Co., assignee of A. W. Hanson, both of Midland, Mich., U. S. A.

416,591. Polymerizing a Mixture of Compounds, One of Which Contains the Polymerizable Group >C = CH2 and No Other Polymerizable Group, and Another of Which Is an Ester of a Saturated Polycarboxylic Acid in Which the Hydrogens of More Than One Carboxyl Groups Are Replaced by Allyl Groups. B. F. Goodrich Co., New York, N. Y., U. S. A., assignee of B. S. Garvey, Akron, and C. H. Alexander, Cuyahoga Falls, co-inventors, both in O., U. S. A.

416,634. Copolymers Comprising a Monocyclic Terpene Ester of an Acrylic Acid Interpolymerized with a Vinyl Compound Other Than Such Esters. Wingfoot Corp., Wilmington, Del., assignee of A. M. Clifford, Stow, O., both in the U. S. A.

United Kingdom

556,036. Esters of Acrylic Acids. Wingfoot Corp.

556,113. Interpolymers of Vinyl Esters. E. I. du Pont de Nemours & Co., Inc.

556,150. Preparing Guanidine and Biguanide Bases. American Cyanamid Co.

556,392. Polymerization of Rosin and Its Esters. Hercules Powder Co.

556,622. Preparing Resinous Condensation Products and Products Obtained Thereby. Resinous Products & Chemical Co.

MACHINERY

United States

2,331,963. Apparatus to Make Rubber Overshoes. J. A. da Cunha, Rio de Janeiro, Brazil.

2,333,369. Apparatus for Applying Latex to Absorbent Sheets in Making Artificial Leather. J. L. Glickman, Brooklyn, N. Y.

2,335,169. Tire Making Drum. H. C. Bostwick, assignor to Akron Standard Mold Co., both of Akron, O.

2,335,878. Tire Vulcanizer. L. G. Oren, Oakland, Calif.

2,336,578. Mold for Synthetic Resinous Products. J. H. S. Skoning, Central Falls, R. I.

2,336,754. Apparatus for Preparing Permeable Hard Rubber Strips for Vulcanization. H. J. Schellhammer, Whitestone, N. Y., and K. E. Hunt, Pequannock, N. J., assignors to American Hard Rubber Co., New York, N. Y.

Dominion of Canada

416,159. Tire Building Apparatus. General Tire & Rubber Co., assignee of W. J. Breth, both of Akron, O., U. S. A.

416,193. Tire Retreading Mold. Super Mold Corp. of California, assignee of E. A. Glynn, both of Lodi, Calif., U. S. A.

416,208. Tire Building Apparatus. Wingfoot Corp., Wilmington, Del., assignee of R. C. Bateman, Akron, O., both in U. S. A.

416,635. Portable Conveyer System. Wingfoot Corp., Wilmington, Del., assignee of E. W. Stephens, Akron, O., both in the U. S. A.

UNCLASSIFIED

United States

2,334,893. Inner Tube. G. C. Arey, Fort Thomas, Ky.

2,335,228. Tread Block Core for Endless Tracks and the Like. E. L. Allen and H. B. Muster, both of Cleveland Heights, assignors to R. I. Schonitzer, Shaker Heights, all in O.

Dominion of Canada

415,978. Wheel Structure Including a Rim Carrying a Tire. G. A. Lyon, Allenhurst, New Jersey, U. S. A.

TRADE MARKS

United States

404,339. Representation of an oval with the word: "Beauty." Brassieres and girdles. H. Bierman, doing business as Beauty Brassiere Co., Newark, N. J.

403,351. Representation of an octagon surrounding the letters: "C, I, B, A." Synthetic resins. Society of Chemical Industry in Basle, Basel, Switzerland.

403,352. Representation of a rectangle with the word: "Ciba." Synthetic resins. Society of Chemical Industry in Basle, Basel, Switzerland.

404,486. Glascote. Distillation units, evaporators, polymerizers, etc. Glascote Products, Inc., Cleveland, O.

404,495. Loabond. Solutions and dispersions of a synthetic resin. Catalin Corp., New York, N. Y.

404,634. Inner-Seal. Part-rubber weather stripping. Bridgeport Fabrics, Inc., Bridgeport, Conn.

GR-S Antioxidant Content

MEMORANDUM
To: Consumers of GR-S
FROM: H. E. Simmons
Office of Rubber Director
SUBJECT: Antioxidant in GR-S

On September 1, 1942, you were advised by this Office that GR-S contains 2% of antioxidant. It would have been more accurate for us to have said that 2% of antioxidant is used in the process of manufacturing the synthetic rubber. It is added in the process of producing the GR-S to stop polymerization, and thereby stabilize the product.

The operators of the synthetic rubber plants have found that the amount of antioxidant used could be reduced from 2% to 1.5% without encountering any difficulties, and thus conserve the supply of antioxidants.

It has also been determined on examination of a large amount of data submitted by the compounders from different laboratories that this reduction will not increase the requirements of antioxidant in the compounding of the rubber.

The Rubber Reserve Co. is, therefore, instructing the operators of GR-S plants that beginning January 1, 1944, they shall use 1.5% antioxidant in their production.

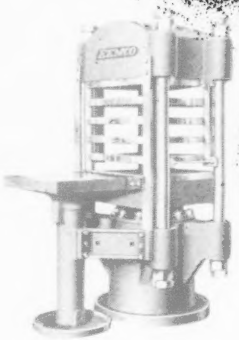
We are giving you this information because we feel that whenever a change of this nature is made, the consumers should be notified.

December 28, 1943.

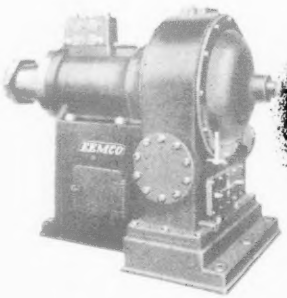
Rims Approved and Branded by The Tire & Rim Association

Rim Size	Nov., 1943
15" & 16" D. C. Passenger	
16x4.00E	70,098
16x4.50E	24,680
16x5.00F	597
15x5.50F	9,472
16x5.50F	61
10x6.00F	3,525
17" & Over Passenger	
18x2.15B	12,068
Military	
16x4.50CE	121,372
16x6.50CS	52,045
20x4.50CR	4,688
20x6.00CT	14,324
18x8.00CV	7,648
20x10.00CW	3,127
24x10.00CW	124
Flat Base Truck	
18x4.33R (6°)	406
20x4.33R (6°)	50,165
15x5.00S (7°)	5,387
18x5.00S (7°)	6,050
20x5.00S (7°)	349,932
15x6.00T (8°)	7,493
20x6.00T (8°)	44,956
22x6.00T (8°)	15,977
20x7.33V (9.10°)	18,481
Tractor & Implement	
12x2.50C	3,019
12x3.00D	8,011
15x3.00D	1,271
19x3.00D	6,105
24x6.00S	937
36x6.00S	838
24x8.00T	1,150
W8-38	1,918
W9-38	1,823
W10-24	477
W10-26	567
W10-28	1,462
W10-36	511
W10-38	4,372
W10-40	1,543
DW9-38	5,902
DW10-38	6,530
DW12-30	262
Cast	
24x15.00	41
TOTAL	869,415

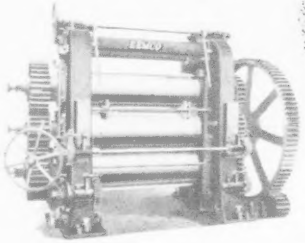
RUBBER AND PLASTICS PROCESSING MACHINERY



PRESSES



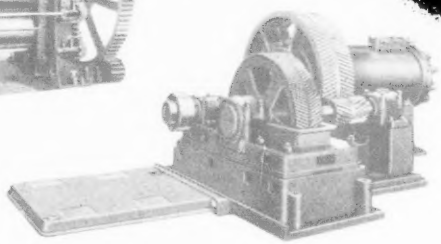
TUBERS

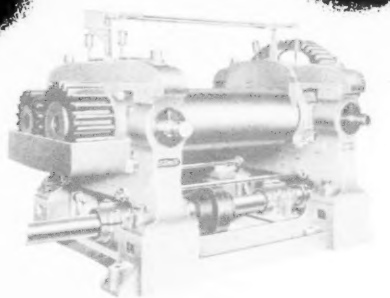


CALENDERS

STRAINERS

MILLS





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MILLS - REFINERS - TUBERS - EXTRUDERS
STRAINERS - HYDRAULIC PRESSES
CALENDERS - CRACKERS - WASHERS

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WRITE FOR DETAILS

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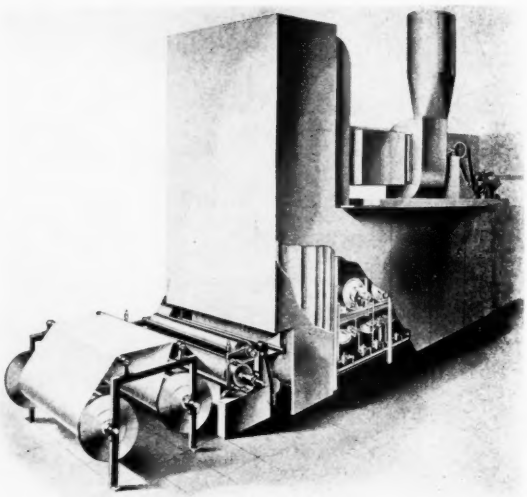
30 CHURCH ST. NEW YORK 7, N. Y.

New Machines and Appliances

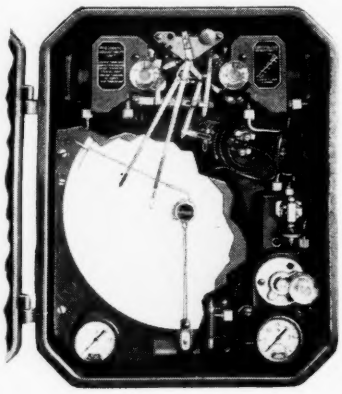


New Butterworth Apparatus for Impregnating Rayon Cord

Machine to Impregnate Rayon Cord with Latex

A NEW machine has been designed and built for the continuous processing of rayon tire cord with latex rubber. The installation uses the padding technique of immersion in latex, squeezing between rollers and drying on cans, taking care that the solution is so adjusted to the pick-up that the proper amount of latex impregnates the rayon cord. The cord is first fed into a two-roll micro-set padder with constant tension let-off to insure necessary stretch. After constant squeeze under a pressure of 4,000 psi., the cord passes through a heated chamber. This predrying speeds up the whole process. Next the cord passes over a series of 28 steam-heated drying cans, which are arranged vertically with split drive to control tension while being dried. The cord is wound on to a constant tension winder at the end of the machine. One of the largest tire manufacturers in this country has been operating this machine at a speed better than 25 yards a minute. H. W. Butterworth & Sons, Philadelphia 25, Pa.

New Pneumatic Set Controller



Taylor Pneumatic Set Controller

TO MEET an increasing demand for a dependable controller whose control point, as indicated by a set pointer, would be automatically adjusted by variations in output air pressure from another remotely located instrument, which may be an indicator, recorder, or controller, a pneumatic set controller has been developed in both the indicating and recording forms. The controller is fundamentally a Fulscope controller with an additional unit to convert changes in input air pressure into linear movements of the set pointer. The magnitude of the linear set pointer movement per pound change in input air pressure is governed by the setting of the

(Continued on page 414)

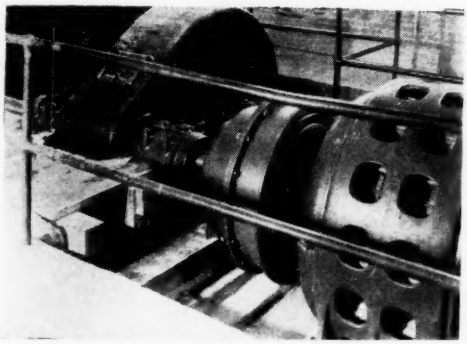
FASTER MANEUVERABILITY WITH FAWICK CLUTCHES

Perfect Performance

This revolutionary new clutch controls power by air. It is economical. It always works. It needs no arms, levers or toggles. It requires no lubrication or adjustments. Maintenance cost is exceptionally low.

The Fawick Airflex Clutch and Brake has earned its place in heavy-duty service where there is no room for failure. Hundreds are in use on new Navy and Merchant Marine vessels because, more than any other clutch, they permit faster maneuverability — faster starts, quicker stops.

If your equipment needs a clutch, brake, slip clutch or flexible coupling, you are invited to send us details and get our recommendations. Booklet on request.



For Rubber Mill Drives

Combined Airflex Clutch and Brake is reliable, smooth-starting, quick-stopping. Absorbs shocks and compensates for misalignment. Compact design saves space. Low maintenance costs.

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FAWICK *Airflex* CLUTCH

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FOR SYNTHETIC RUBBERS—
POLYVINYL BUTYRAL, ETC.

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GLYCO PRODUCTS CO., INC.
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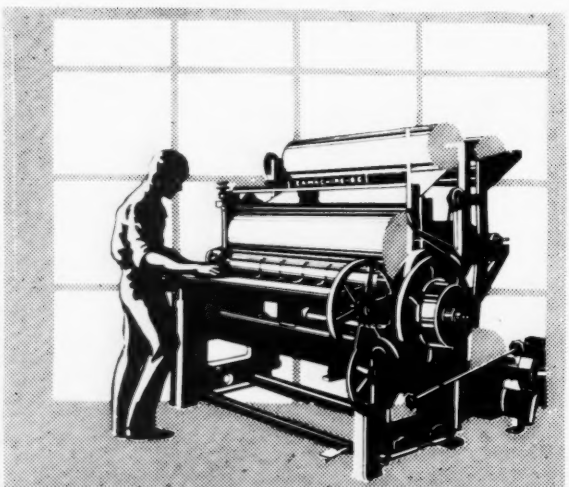

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EUROPE

RUSSIA

Selenium in Compounds Containing Synthetic Rubber

In recent years interest in selenium as a compounding ingredient for rubber has waned considerably. Results, however, of experiments carried out in Russia in 1934 with selenium in mixes containing synthetic rubber may be worth noting at this time. In one series of tests were used tread compounds made with sodium butadiene rubber (produced at the Jaroslav factory and having a plasticity of 0.52) alone and in combination with various amounts of smoked sheet, to which was added a thoroughly ground and sifted domestic selenium preparation having a specific gravity of 4.49. The mixes were taken from master batches prepared on factory mills and contained all the usual ingredients except sulphur, selenium, and accelerator, which were incorporated later in varying proportions with the aid of a laboratory mill. After resting for 24 hours, the mixes were vulcanized to two-millimeter-thick sheets in a hydraulic press, and samples were tested with a Scott testing machine.

The composition of the three basic tread mixes employed in this series of tests follows:

	Type 1	Type 2	Type 3
Synthetic rubber	100	50	25
Smoked sheet	...	50	75
Maikop black	40	40	40
Zinc oxide	5	5	5
Pine tar	3	3	3
Stearic acid	3	3	3
Ceotax	0.8	0.8	0.8

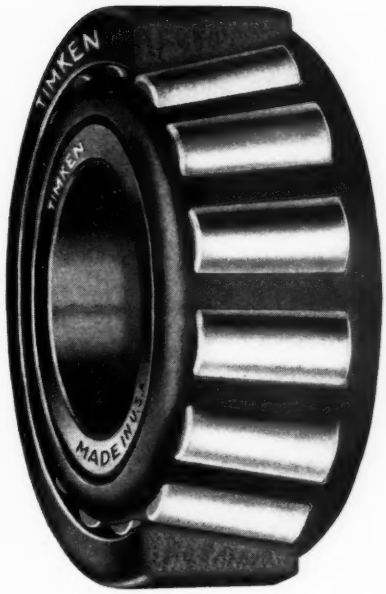
To these were added sulphur and selenium in varying proportions ranging from 0.5 to 3.5 parts by weight on the total rubber. The control mix contained 3.5 weight parts of sulphur per 100 parts of rubber and no selenium.

It was found with Type 1 that if the same proportion of selenium is used, but the amount of sulphur increased, there is a decrease in almost all the mechanical values of the vulcanizates, that is, in relative elongation, tensile strength, tearing strength, hardness, permanent elongation and abrasion. Mixes which contained 2% selenium in combination with 0.5 or 1% sulphur gave the best tensile values, hardly differing in this respect from the control. Greatest resistance to abrasion was found in mixes containing 1% selenium plus 3% sulphur, and 3% selenium plus 3% or 2% sulphur, that is, in the hardest and least elastic compounds. The increase in abrasion resistance here was almost 20% above that of the control. Mixes containing selenium and minimum amounts of sulphur had the same aging resistance as the control, but an increase, in sulphur, especially in combination with 3% selenium, caused a sharp drop in aging resistance. On the whole, the addition of selenium to read compounds of 100% synthetic rubber did not appear to improve quality, for though the resistance to abrasion was increased, tensile strength and aging resistance were lowered; in other words the increase in abrasion resistance was achieved at the cost of over-vulcanization.

With Type 2, as in the case of the 100% synthetic rubber mixes, the effect of increasing the amount of sulphur used with a given amount of selenium was to lower the mechanical values of mixes of 50% natural rubber plus 50% synthetic rubber, but only as far as the mixes containing selenium and sulphur both were concerned. For the data obtained indicated that the presence of selenium caused a distinct *rise* in the mechanical values of the Type 2 compounds as compared with those of the control, which again contained 3.5% sulphur, but no selenium.

The best mechanical indices were obtained when 0.5% selenium was used with 1% and 2% sulphur, and with 1% and 2% selenium plus 1% sulphur. Increasing the amounts of sulphur and selenium above these proportions led to considerably lowered strength of the vulcanizates, especially when 3% selenium was used. The best abrasion resistance was observed when the minimum amount of selenium was used plus any proportion of sulphur; then abrasion resistance was 30% above that of the control. With the maximum amount of selenium, abrasion resistance differed but little from that of the control. Aging was best when the smallest amounts of sulphur and selenium were used, when it was nearest that of the control.

IS IT TIMKEN BEARING EQUIPPED ?



STILL A LEADING QUESTION WITH EQUIPMENT BUYERS

The experience learned from war probably will bring about radical changes in the processing of rubber and the manufacture of rubber products. Much new equipment is in course of development, but however different it may be in design, it will be beset by the same old bearing problems, for which Timken Tapered Roller Bearings will, as usual, stand ready to provide the solution.

For Timken Bearings it simply will be a repetition of what they have been doing for more than three decades in one industry after another—stepping up speed and smoothness; promoting precision; increasing endurance; reducing maintenance; through their ability to eliminate friction, carry radial-thrust loads and hold moving parts in correct and constant alignment.

Thus, the presence of Timken Bearings and their number still will be indicative of superior performance in new rubber processing equipment of any kind. The Timken Roller Bearing Company, Canton, Ohio.

Counter the threat of post-war competition by giving your new equipment Timken Bearing advantages in full.

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TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

DAY Rubber Cement Mixer

HERO TYPE

for

SPEEDY PRODUCTION

Interior View Showing Heavy Agitator Blades

The Day Hero Rubber Cement Mixer requires much less time for dissolving a batch than does the older type of mixer. Four sets of stationary blades, spaced at 90 degrees, extend downward from the top frame. Two sets of blades, spaced at 180 degrees, extending upward from heavy agitator arms located at the bottom of vertical shaft, rotate with the shaft.

The lower picture shows the blade section of the Day Rubber Cement Mixer, illustrating the close clearance between the stationary and the moving blades, which shear the rubber into smaller and smaller pieces, constantly exposing more surface to the action of the solvent.

THE J. H. DAY COMPANY

CINCINNATI OHIO

The behavior of Type 3 mixes in the presence of selenium and sulphur differed in several respects from that of the two preceding mixes. The changes in mechanical values were much less marked and consisted chiefly in a slight decrease in relative elongation, but increase in permanent elongation, and a small increase in hardness; tensile strength of the selenium and sulphur samples remained practically the same. But as in the case of Type 2 mixes, the presence of selenium increased tensile strength as compared with the control, but to a less marked degree. The best tensile values were obtained with 1% and 2% selenium, and 1% to 3.5% sulphur. Resistance to abrasion was higher than that of the control, but amounted to 15-20% against 20% and 30% for the preceding mixes. The best results were observed with 0.5% selenium plus 2 to 3.5% sulphur. On the other hand Type 3 mixes, especially those with 1-2% selenium and 1-3% sulphur had much better aging resistance than the all-synthetic mixes and those containing 50% synthetic and 50% natural rubber.

The effect of selenium in other than tread compounds was also investigated, and a series of tests were carried out with a compound consisting of 100 parts synthetic rubber, 60 China clay, five parts zinc oxide, three parts stearic acid, 0.8-part Captax, and sulphur in the proportions of 0.5-part, one part, two, and three parts and selenium in proportions of one part, two, and three parts on the rubber. The control mix contained 3% sulphur, but no selenium. As in the case of Type 1 mix (100% synthetic rubber plus Maikop black), selenium on the whole causes little improvement, if any, in mechanical properties; but there is one difference here: aging properties are rendered far superior to those of the control, especially when a minimum of a sulphur is used—0.5-1%.

For tests of the effect of selenium on oil resistance was used a basic compound of 100 parts synthetic rubber, 110 G.E.T. black, seven parts magnesium oxide, two parts pine tar, one part DPG and proportions of sulphur and selenium ranging from 0.5 to 3% and 1% to 4% respectively. The control mix again contained 3% sulphur, but no selenium. Tested for mechanical properties, the samples gave results similar to those obtained with the tread compound, Type 1. In the swelling tests the poorest results were always observed when the minimum amount of sulphur was used, irrespective of the amount of selenium. But the use of maximum sulphur and maximum selenium resulted in considerably improved oil resistance, which in some cases was as much as 20% above that of the control.

Finally, friction compounds made up of 100 parts synthetic rubber, 40 G.E.T. black, five parts zinc oxide, five parts Rubrax, 10 vaseline oil, 0.8-part Captax, and 1-3 parts of sulphur plus 0.5-part to three parts of selenium were tested for adhesion. The control, as before, contained 3% sulphur, but no selenium. This compound was applied to tire fabric, which was pressed together with a hand roller and cured in a hydraulic press for 30 minutes. Then samples were cut, and the adhesion of the plies tested by means of a Schopper testing machine. The best results obtained showed hardly any improvement over the control. But tests with the Scott flexing machine showed that the addition of selenium had a very favorable effect on the flex resistance of rubberized materials.

GERMANY

According to foreign reports, Germany has been attempting to use various plastics to replace metal in the construction of pumps, as coatings for metal pumps, and in general machinery construction. Judging by available data only moderate success has been scored, as the plastics have various disadvantages which in many cases render their use for the above purposes something less than satisfactory. The plastics on the whole have good chemical resistance, but have a tendency to swell, which is particularly marked in the case of those filled with cellulose and textile products because of moisture absorption. In plastics loaded with asbestos and with crushed and ground stone this tendency is far less pronounced and is still less in unfilled plastics. The latter, however, are more difficult to press. The extended use of plastics for pumps is also hampered by their comparatively low resistance to high temperatures; efforts have been made to remedy this defect, but so far with only limited success.

Sheets of the hard polyvinyl chloride known as Vinidur have been used as general construction material for machinery and on machine parts made of most metals with the exception of lead and certain light alloys.

Recent trade agreements between Bulgaria and Germany provide that the latter supply 10 tons of rubber a month for use for machine parts. It is not stated whether the rubber is already manufactured or whether it still has to be converted into the necessary mechanical goods.

GREAT BRITAIN

The Future of Rubber Plantations

Any discussion about the future of rubber plantations by experienced rubber men cannot but be of interest to all in any way connected with the industry. The various problems to be faced in the future were presented by Harold F. Copeman, chairman of South Perak Rubber Syndicate, Ltd., at the company's recent annual meeting. The first problem is to what extent estates will be affected by neglect, mishandling, and damage directly due to hostilities. Deterioration due to neglect, he stated, will depend largely on the proportion of young rubber on estates, for barring the risk of disease, old rubber is not likely to suffer seriously from this cause and in some cases may even benefit. The damage due to hostilities would be determined by the proximity of estates to main roads, railways, and airfields.

The second question is the cost of production. Here the determining factor will be the postwar labor situation, since wages and salaries make up three-fourths of the total cost of producing rubber. Third is the question as to the time it will take to restaff and re-equip estates once the enemy has been driven out. Loss of equipment, materials, and buildings is likely to be very heavy, but equally serious will be the lack of immediately available experienced planters, many of whom have been prisoners and will have to rest and recuperate before they can resume work.

The fourth problem is synthetic rubber—the amount of competition it is likely to offer; the amount of protection the American Government will grant it if costs should be too high; its usefulness for tires. Finally Mr. Copeman considers what he calls the time factor, that is, the length of time required for reconstruction, for the world to begin to get back into its industrial stride, for new markets, like Russia and China, to begin to develop according to their potentialities.

In connection with Mr. Copeman's remarks about the time lag due to loss of material and equipment, it is pointed out in an article in *The India Rubber Journal* that the resumption of tapping need not await the replacement of equipment, etc., since the old, primitive methods of preparing rubber could—and probably in many cases would—be resorted to in the meantime.

On the subject of damage to estates it may be added that there is a widespread, no doubt well-founded, feeling that the Japanese will not destroy the plantations as long as they are in possession, and that when they are finally driven out, and if this is done speedily enough, they will not have the time to do any extensive damage.

It is well to remember, however, that while the Japanese now have far more rubber than they can possibly use, they lack other commodities, cotton for instance, and grain. Tokyo broadcasts reportedly state that the Japanese will not tolerate ill-managed estates and that any such would be converted to the production of other crops. Then the question is, what do the Japanese understand by ill-managed estates—such as are properly cared for or such as give high yields per acre; and how long will it, under present conditions,

New help . . . as well as new materials and processes in the rubber industry . . . make it more essential than ever to use the Cambridge Pyrometer for checking temperatures. No skill is required to use this labor-saving instrument. With the *Cambridge*, temperature determinations of rolls, molds and masses are accurate, simple and quick.

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3732 GRAND CENTRAL TERMINAL, NEW YORK, N. Y.

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CAMBRIDGE
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HOW "Automatic" FIRE-FOG WORKS

The way "Automatic" FIRE-FOG goes into action, when oil or other flammable liquid ignites, amazes—and re-assures—those who have seen it perform. In a matter of seconds this is what FIRE-FOG does:

A mist-fine water spray automatically blankets and chokes the fire. FIRE-FOG Nozzles, properly placed and directed at time of installation, assure the complete spraying of the fire area.

The cooling spray that so thoroughly encircles the fire, produces a "ring of isolation." Thus, the fire is confined and the danger of spreading is reduced to a minimum.

With FIRE-FOG actively and relentlessly spraying every square inch of burning surface, the flames are brought under control almost immediately and the fire is quickly quenched.

This, briefly, is the story of "Automatic" FIRE-FOG in action. The details of this outstanding system of fire protection should be *must* information for every executive concerned with fire protective measures. An "Automatic" engineer will be glad to call—no obligation, of course.

TEST IT—PROVE IT! At "Automatic's" Proving Ground in Youngstown, Ohio, full scale fires, using a quantity of your own flammable liquid, will determine the kind of fire quenching system you need. Your fire hazard conditions are reproduced, fires are started, experiments are made. *Guess-work is eliminated.*

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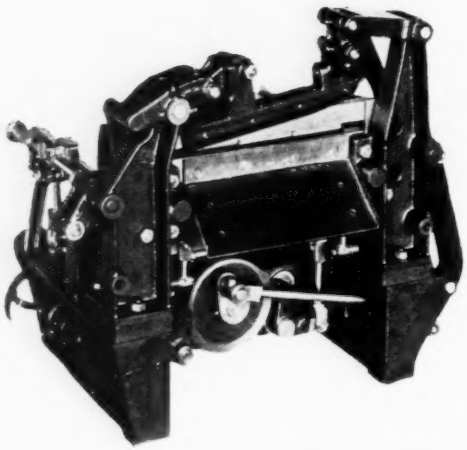

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take for estates not already designated ill-managed to come under that head? These points would presumably depend on the length of time the Japanese remained in possession and how great their need became of food crops and raw materials other than rubber.

Synthetic Rubber in the House of Commons

The question why Britain has practically no synthetic rubber industry of her own and what the government is going to do about the matter is repeatedly brought up in the House of Commons. A few months ago it was revealed in this way that a company had offered to produce synthetic rubber in England, but that negotiations were still pending. Recently a persistent member brought up the matter again and the Minister of Production, Mr. Lyttleton, admitted that discussions were still going on as there were various points on which agreement had not yet been reached.

Other questions in the House of Commons revealed that the idea that England is dependent on the United States for supplies of synthetic rubber is unpalatable to many members who consider that since synthetic rubber is likely to compete with natural rubber after the war, Britain should begin to do something about the matter now. It also appeared that it is suspected that cartel arrangements between the Standard Oil Co., of America, the German I.G. Farbenindustrie, and certain British interests are responsible for the fact that England has no synthetic rubber industry and, it is feared, will not have one even after the war.

Referring to the establishment of a synthetic rubber industry now, Mr. Lyttleton replied that he could only consider the present wartime position and the effect on manpower, adding that "we are fully able to supply the whole of our requirements during the war from crude rubber, and export quite a substantial surplus besides." As to cartel operations, he assured members that no such question had arisen in England, nor had it influenced the attitude on synthetic rubber production, which he repeated, was dictated by the demands of manpower; but the fact that nothing was being done now did not mean that something would not be done later on.

Incidentally, lest the British public draw the wrong conclusions from the Minister's statements about rubber supplies here, the Ministry of Production issued an explanation emphasizing that Mr. Lyttleton's statement regarding the sufficiency of rubber supplies "assumed a continuance of the present economy in the use of rubber and the collection of scrap."

Symposium on Rubber-Like Plastics and Their Applications

The Society of Chemical Industry (Plastics Group), the Institution of the Rubber Industry, and the Institute of the Plastics Industry held a joint meeting in London on November 2, which took the form of a symposium on "Rubber-Like Plastics and Their Applications." The papers included: "Chemistry of Rubber-Like Plastics", W. J. S. Maunton; "Processing of Rubber-Like Plastics", H. Barron; "Present Position of Rubber-Like Plastics in the Rubber Industry", H. Rogers. "The Use of Plastics as Alternative to Rubber for Proofing Purposes", A. Ryan; and "Cables", H. B. Chapman.

FAR EAST

CEYLON

Compensation for Slaughter Tapping

As an inducement to rubber growers to increase output by slaughter tapping, the British Government offers to pay compensation at the rate of £45 per acre, to begin in two years' time. Low country planters consider that the scheme has few attractions for them and none at all for the small holder. One of the greatest disadvantages of the scheme, it is said, is the provision that compensation must be used to replant rubber. It is felt that it would be fairer to let owners replant with what in their opinions are the most economic crops and that at the same time rubber planting on new

Plasticizers and modifiers for natural and synthetic elastomers

ELASTICATOR TYPES

PRODUCT	COMPATIBILITY	SUGGESTED USES
DIBUTYL SEBACATE	Natural and synthetic rubbers, PVC and PVB.	For extreme low temperature flexibility.
DIBENZYL SEBACATE	Natural and synthetic rubbers, PVC and PVB.	For combination of excellent high temperature permanence and good low temperature flexibility.
DIBENZYL PHTHALATE	Natural and synthetic rubbers, PVC and PVB.	For combination of excellent high temperature permanence and good low temperature flexibility.
DICAPRYL PHTHALATE	Natural and synthetic rubbers, PVC and PVB.	Permanence much superior to dibutyl phthalate: other properties similar.
PLASTICIZER 35	Natural and synthetic rubbers, PVC and PVB.	Of greatest interest for PVC and PVB compositions. Particularly efficient plasticizer for PVB stocks.
PLASTICIZER 36	PVC and PVB.	For PVC and PVB stocks requiring excellent heat permanence and superior low temperature flexibility.

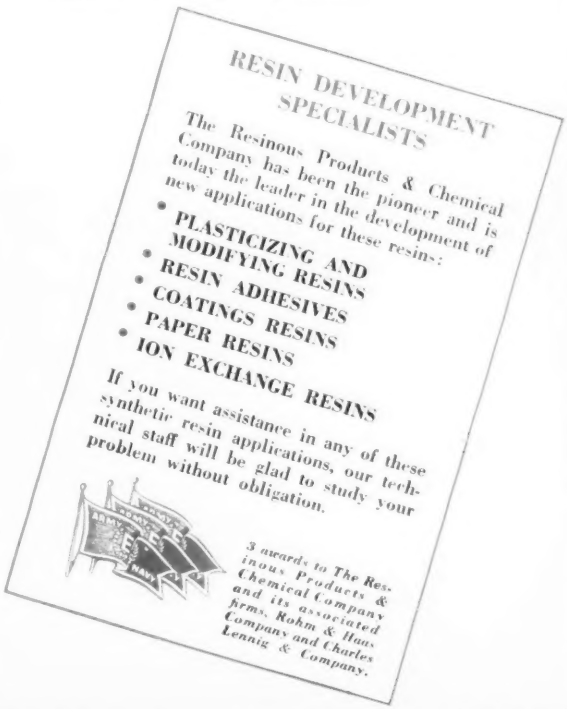
RESINOUS TYPES

PRODUCT	COMPATIBILITY	SUGGESTED USES
RESIN R6-3	Excellent with synthetics and PVB. Limited with natural rubber and PVC.	For oil resistance and high temperature service.
DURAPLEX C-50LV	Synthetic rubber.	Primarily for Buna N types. Provides excellent processing characteristics and good oil and heat resistance.
PARAPLEX G-25	Excellent with synthetics. Compatible over a wide range with PVC.	Primarily for Buna N and PVC polymers. Excellent heat, oil and flame resistance. Good low temperature flexibility.
PARAPLEX RG-8 PARAPLEX G-20	Primarily with PVB.	A plasticizer and extender-modifier with PVB.

PVC—Polyvinyl chloride and related co-polymers. PVB—Polyvinyl butyral.

SINCE the many new compounding problems confronting the rubber industry introduce rapidly changing requirements, research in the field of plasticizers and modifiers is being constantly carried on at The Resinous Products & Chemical Company. In addition to the products listed in this table, which have already demonstrated their merits in commercial use, many other new materials are being developed, or are now undergoing laboratory study.

If you have a special problem in elastomer compounding, we invite your inquiries. Perhaps one of our materials now in the laboratory stage may merit your experimental study . . . or your requirements may suggest a new direction for our own research that may enable us to solve your problem.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• COATINGS RESINS
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• ION EXCHANGE RESINS
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land, but only in high yielding areas, should be permitted. In this way there would be no appreciable decrease in the total rubber area while future yields would be higher than from replanted rubber. This, it is pointed out, is an important consideration for the country's competitive position under postwar conditions, especially in view of the synthetic rubber developments in the United States.

Again, while the minimum that an owner must slaughter tap is 20% of his total area, he gets no compensation for anything over that proportion. It is suggested that an increase in the price of rubber to one rupee per pound would act as a better stimulant to raising outputs, and that the increase in price could be accompanied by compulsory payment of bonuses to laborers who bring in more than the average amount of rubber.

Despite the admitted drawbacks of the compensation scheme it is understood that a fairly large number of applications have been received from those who wish to cooperate, and the Rubber Commissioner has requested owners to commence intensive tapping immediately, although various details still have to be arranged.

Piece-Rate Pay

The increased wages received by labor in Ceylon has led to much malingering and absenteeism. To combat this there had for some time been great agitation for the introduction of a system of piecework payments. Finally the Controller of Labor agreed to such a plan, and a special branch of his department, under a Deputy Controller, was created to administer the scheme scheduled to go into effect September 1, 1943. Planters have the option of paying according to the existing minimum wage scheme or the new piece-rate plan, and those choosing the latter were requested to register, but on last reports surprisingly few estates—about 5% of the total—had applied for registration under the new plan.

Training in Tapping and Rubber Technology

The government contemplates establishing schools in rubber-growing areas where village boys and girls will be trained in proper methods of tapping rubber and collecting latex. Already a few trial schools have been started in order to study the workings of such institutions and to improve methods and organization where necessary. Further plans for training the more intelligent boys in factory work are also under consideration.

A large Indian shoe manufacturing concern is reported to have offered to train Ceylon students in rubber technology. This training is to be given at the company's factory in Calcutta, and students will be expected to pay all their own expenses without financial aid from the government.

Expanding Industry in Ceylon

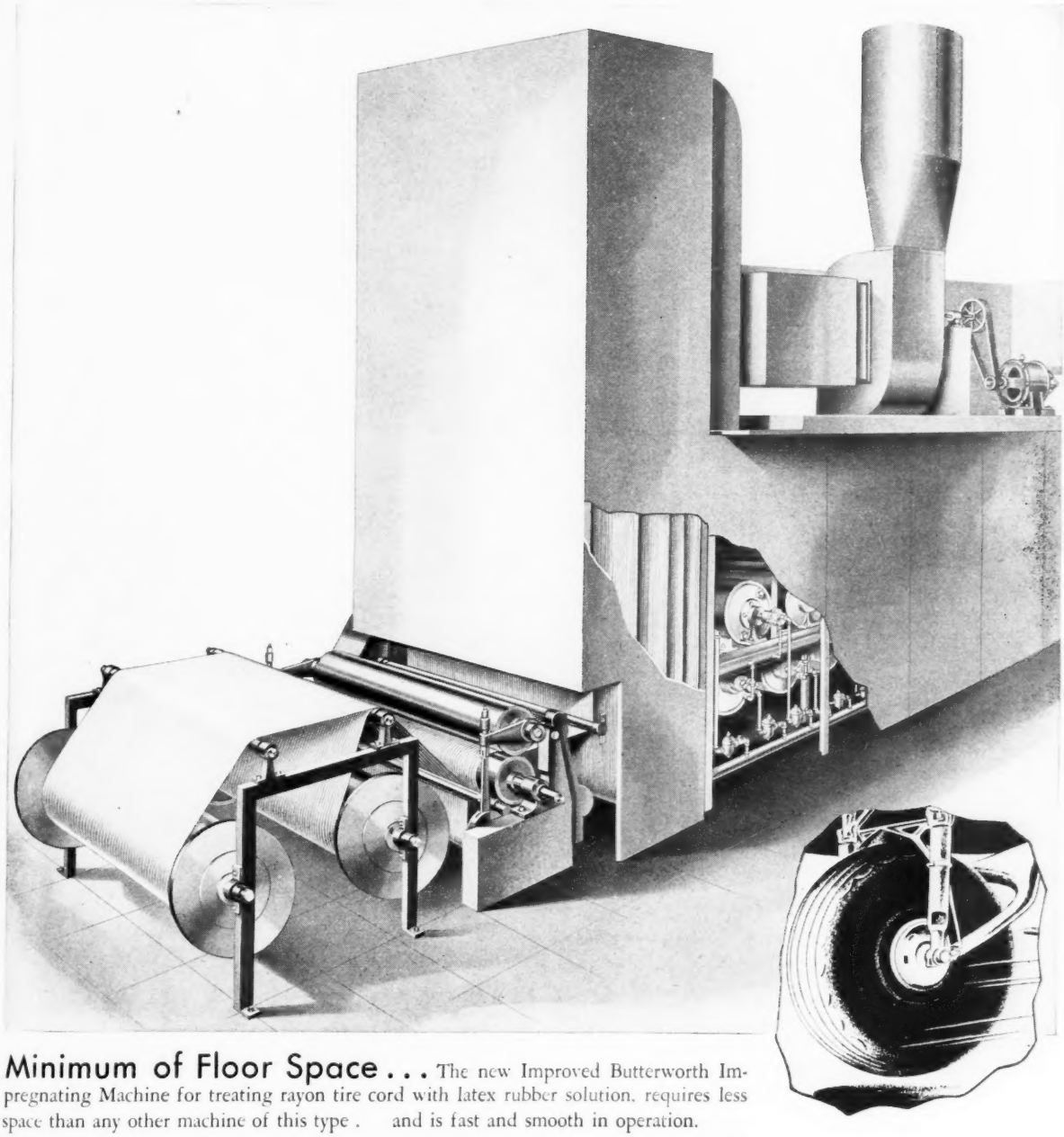
Progress in establishing a local rubber manufacturing industry has been slow. Some years ago two Englishmen came to Ceylon to start a state retreading factory, but nothing resulted. Since then the war has, of course, prevented the realization of plans for a state rubber industry. For one thing, there is the difficulty of getting the necessary machinery from England, and it is also hard to find suitable experts now. At a recent session of the State Council, however, it was revealed that the Dunlop and Firestone companies have been asked to help Ceylon in this field and to start rubber factories locally as they have already done in India.

Ceylon, which began manufacturing acetic acid after the outbreak of the war, has for some time been conducting experiments to determine the possibility of utilizing the residue material for the manufacture of plastics.

The Industrial Laboratory of the Ceylon Department of Commerce recently reported that satisfactory results have been obtained in the production of a plastic suitable for use in the manufacture of plywood. The local product is said to compare favorably with similar imported plastics, and further experiments are to be carried out at the Gintota plywood factory.

JAPAN

Supplementing other information on Japanese activity in Far Eastern rubber centers, a report via Germany indicates 40% of the existing area of rubber estates (estimated at 1,620,000 acres in Malaya and 790,000 acres in Sumatra) will be divided among private undertakings; the balance will remain under the Military Administration. Estate factories are to be rationalized. Natives in Malaya, whose rubber gardens cover an area approximately equal to that formerly owned by Europeans, will retain possession of their



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holdings. However the Military Administration warned it will tolerate no superfluous or ill-managed estates; these are to be converted to growing food.

The report further indicates that Singapore Rubber Mills, Ltd., which used to remill native rubber, has been reorganized and under its new Japanese name, Shonan Gomu Kumia, is producing oil from crude rubber on a fairly large scale. Apparently Japan finds it more practicable to produce oil by this method, which experiments conducted by Europeans in the Far East several years ago showed to be expensive, than to try to put oil wells into working order. With enormous quantities of unsalable raw rubber on their hands which cost them little, if anything, in the first place, the Japanese no doubt actually find it cheap to produce fuel oil from rubber.

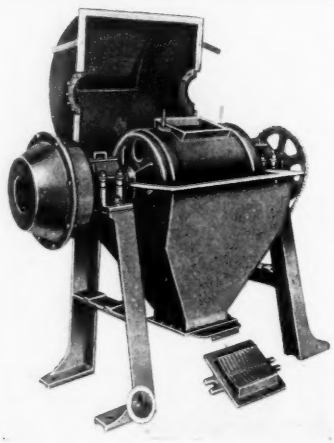
A Japanese broadcast stated various rubber goods including raincoats, icebags, holders for toilet articles, etc., are to be made available throughout Japan; new prices have been fixed on these goods 10-15% under previous rates.

Set Controller

(Continued from page 404)

adjustment dial provided in this unit. The unit also provides for set pointer adjustments in either direction for an increase in input air pressure, and for limiting the travel of the set pointer within given limits. The instrument is also equipped with a manual set pointer adjustment feature. The pneumatic set controller has proved its versatility in a large variety of control applications where the set pointer of the controlling mechanism must be automatically and continuously adjusted in relation to variations in some other controlled or uncontrolled process variable. In the production of synthetic rubber the device is being used to control the jacket water temperature of reactors to maintain constant product temperatures, and it is also being used to control the speed of internal-combustion engine-driven air compressors to maintain constant suction or discharge pressures. In air conditioning work the instrument makes possible keeping a fixed temperature ratio between outdoors and indoors, thus eliminating the shock experienced when there is too great a variation between the two. Taylor Instrument Cos., Rochester, N. Y.

Unique Combination Grinding Mill



Combination Grinding Mill

A UNIQUE design of a grinding mill has been developed which incorporates in one machine several functional variations, making it particularly useful for multiple processing requirements of laboratories or for special plant operations. This machine (similar to the usual ball or rod mill) consists of a steel cylinder rotating in bearings. The main trunnions or shafts are hollow to permit the introduction and removal of the material to be ground or processed. The hollow trunnion at the opposite end is provided with a grating to prevent the discharge of the grinding media. Provision is made for quickly closing both trunnion openings when the mill is to be used for batch grinding. A manhole opening is located in the shell of the mill. This is provided with a solid cover, a slotted cover for dry discharge, and a wet discharge cover. The mill can be used for batch grinding, either wet or dry, as a pebble mill, a ball mill, or a rod mill. It may be used as a chemical processing mill, which may be heated or cooled by means of a jacket and which can also be provided with stuffing joints on each hollow trunnion so that the contents of the mill can be subjected to vacuum or pressure, the admission or withdrawal of gases or liquids, all during the grinding or mixing process. For continuous grinding it can be used as a pebble, ball, or rod mill. The drum-type feeder can be used for feeding either dry materials or wet slurries, and gases or liquids can be introduced or withdrawn while the mill is in operation. Abbe Engineering Co.

Editor's Book Table

NEW PUBLICATIONS

"The Vapor-Pressure Equations of Solutions and the Osmotic Pressure of Rubber." A. R. Miller. Publication No. 33. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England. 16 pages. Assuming that the solute and solvent molecules in a solution can be regarded as occupying sites on a regular lattice and that the potential energy arises for interactions between molecules which occupy closest neighbor sites, the vapor-pressure equations have been determined for solutions in which each solute molecule contains three groups (or submolecules) and occupies three lattice sites in such a way that successive submolecules occupy closest neighbor sites on the lattice while each solvent molecule occupies only one site. The above equations are compared with those already obtained by Fowler and Guggenheim for the case in which each solute molecule contains two submolecules in order to determine the effect on the form of the vapor-pressure equations of the number of submolecules in each solute molecule and this then enables the determination of the vapor-pressure equations when each solute molecule contains n submolecules and occupies n lattice sites in such a way that successive submolecules occupy closest neighbor sites on the lattice. These equations are used to determine the osmotic pressure of solutions of long-chain polymers.

"Chemical Names and Terms Frequently Encountered in the Synthetic Rubber Industry." Hycar Chemical Co., Akron, O. 8 pages. A glossary of the more important words in the field of synthetic rubber and rubber-like plastic materials recently prepared by the Hycar Chemical Co. is presented in this booklet as a guide to proper pronunciations and meanings and as a service to business and industry. It is stated that the glossary is by no means complete, but does include the more common chemical terms and some of the well-established trade names. The booklet should be of considerable help in clearing up some of the confusion concerning these new terms that is evident in many places.

"Evaluation of Mixtures of Silene EF and Calcene T in a GR-S Composition and Comparison of Accelerators and Accelerator-Sulphur Combinations in Silene EF-GR-S Compositions." Columbia Pigments Data Sheets No. 43-5. Pittsburgh Plate Glass Co., Columbia Chemical Division, Grant Bldg., Pittsburgh, Pa. 12 pages. As indicated in the title, this bulletin consists of reports on two somewhat different subjects although both are concerned with the use of Silene EF in GR-S compositions. In the first report it is stated that Silene EF, when incorporated in GR-S in relatively high loadings, imparts good tensile and exceptionally good tear resistance to the finished stock, but has a marked tendency to stiffen the composition. Physical test data obtained with various combinations of Silene EF and Calcene T in 30-, 40-, 50-, and 60-volume loadings to produce a wide variety of properties are presented. In the second report the effect of six different accelerators both alone and in combination are given for a stock containing 40 volumes of Silene EF. Another table lists the physical test data obtained with the same-type stock accelerated with 0.35-part of TMTMS and 0.15-part of Accelerator 808, but in which the sulphur was varied from 0.5 to 4.0 parts. A final table gives results in which the TMTMS and sulphur were both varied.

"The Taylor Guide to Correct Instrument Selection." Taylor Instrument Cos., Rochester 1, N. Y. Bulletin 98170. 24 pages. This bulletin is intended to help industrial instrument users determine easily what Taylor instruments are best suited to their particular requirements. The bulletin is prefaced with a brief note on the importance of correct instrumentation and is followed by an outline of the unique interchangeable feature of this company's instruments. The catalog is divided according to the variables to be measured or controlled, and the final pages are devoted to special-function instruments.

"GR-S Inner Tube Compounding." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8 pages. This booklet presents physical test data on GR-S compounds containing Rio Resin (20% on the GR-S) to show its ability to minimize hardening, stiffening, and shortening during heat aging. It also shows that mixtures of P-33, FT carbon black with either MPC, EPC, HMF, and SRF carbon blacks can be used in a similar compound and provide reasonably good resistance to heat aging. Data are presented on Selenac-Captax and Selenac-Altax sulphurless GR-S inner tube compounds to show their good resistance to heat aging.

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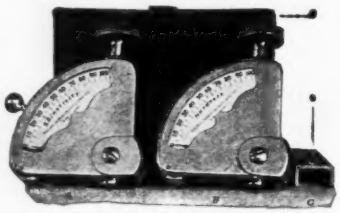

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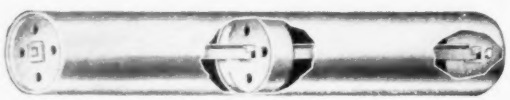

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"The Rubber Industry and the War." General Bulletin No. 1961. The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y. 80 pages. This attractive pictorial presentation summarizes the war story of some 500 American rubber manufacturers. Briefly, concisely, by word and picture, is revealed rubber's contribution to the war effort, including tires, bogie wheels, fuel cells and tanks, rafts, bridges, barrage balloons, gas masks, footwear, rubberized fabrics, mechanicals, and druggists' sundries. Also covered are non-rubber products such as planes, munitions, and chemicals. Sections on synthetic rubber and rubber conservation conclude this interesting booklet designed to show the general public how the rubber industry is doing its part to help win the war.

"Natural Rubber and Synthetic Rubber." Norman Bekkedahl. Instituto Agronômico do Norte, Belem, Para, Brazil. 16 pages. This pamphlet presents both in English and Portuguese a paper presented by Dr. Bekkedahl, of the National Bureau of Standards, Washington, D. C., as given at the Instituto Agronômico do Norte in Belem on November 5, 1943. The author is on leave from the Bureau of Standards to serve as chief of the rubber laboratory of the Institute at Belem. The history of the analysis and synthesis of rubber is described, including a discussion of Buna S and Buna N rubbers and the physical properties of the synthetics compared with those of natural rubber with special reference to use in tires. Other uses of rubber in war and peace are mentioned, and the paper concludes with the suggestion that Brazil should not neglect her vast possibilities in the rubber program, particularly in the fields of botanical and chemical research aimed at the production of improved natural rubbers.

"Manhattan Rubber Products for Industry." Golden Anniversary General Catalog. The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. 138 pages. The catalog in addition to a complete detailed listing of the various mechanical goods products manufactured by this company contains a brief history of its growth during the last 50 years. A section is also included under "Flexlastics", a company trade mark for "elastic materials used in combination with strength members in making of rubber products that have in the highest degree, the essential qualities of flexibility, elasticity and lasting service," quoting from this catalog. Considerable technical information of interest is included in the sections under belt, hose, and other products.

"Second Report of the Postwar Committee of the National Association of Manufacturers." National Association of Manufacturers, 14 W. 49th St., New York 20, N. Y. 96 pages. Stating in the introduction that the government should establish and properly administer legislative and fiscal policies that will provide the framework which best enables business to operate in ways that will produce the utmost in goods and services for the nation and quoting Emerson and President Wilson in this connection, this report presents interesting information on the following major subjects: (1) recommendations for dealing with major problems of the transition period from war to peace; (2) recommendations as to the basic requirements for the long-range maintenance of jobs, freedom, and opportunity for Americans; (3) observations on the postwar distribution of goods and services; (4) principles and proposals for the establishment and maintenance of sound international relations. Discussing the disposal of government owned plants, the report states that the primary problems which should be considered are the military security of the United States and the provision of employment and suggests that Congress should establish a Surplus War Property Commission with authority and direction to dispose of government owned real estate, plants, equipment, and supplies, both after hostilities cease and at such earlier times as the military requirements are substantially satisfied.

BOOK REVIEWS

"The Goodyear Research Laboratory." David Dietz. Published by The Goodyear Tire & Rubber Co., Akron, O. 1943. Cloth. 57 pages, 6 by 9 inches. Illustrated.

David Dietz, distinguished science editor for a large chain of newspapers, is the author of this memorial of the recent dedication of The Goodyear Tire & Rubber Co.'s $1,325,000 research laboratory, built in anticipation of the time when, after victory, the rubber company can again serve the peace needs of the republic.

In this volume the author briefly surveys the technical advancement of rubber, the growth of the Goodyear company, and its

achievements in natural and synthetic rubber research as an introduction to nine immediate objectives of the laboratory. These cover a broad field including the perfecting of natural and synthetic rubber products and plastics, tires, tire cord types, packaging materials, adhesives, protective coatings, and aircraft design.

The U-shaped laboratory, which has 74,000 feet of floor space distributed on three floors, will accommodate a staff of 250 chemists, physicists, engineers, and metallurgists. It contains a bomb-proof laboratory, a fabrics laboratory, and one large room which can be used as a pilot plant. The equipment includes an electron microscope and an analytical spectrometer. An infra-red spectrometer, one of the newest research instruments for identifying organic molecules, was constructed by the Goodyear company.

Among the illustrations are a floor plan and a chart of 54 alchemistic symbols which decorate the exterior of the building. L. B. Sebrell is manager of Goodyear scientific research.

"The Story of the Rubber Life Raft." Edgar G. Wandless. Privately printed by the New York Rubber Corp., Beacon, N. Y. 1943. Cloth, 5 by 7½ inches, 64 pages. Illustrated.

The rubber life raft was born of the necessity of war but it will also prove useful in time of the peace to come when increased numbers of commercial planes traverse the trade routes of the air. The evolution of the rubber life raft, unknown in World War I, is an engaging story as told in this small volume. The wooden raft was the first method of travel on water. Now its rubber counterpart is a complete self-contained unit for the maintenance of life. It is a symbol of hope in contrast to early models developed in the 1920's which were largely symbols of despair. The development of the rubber life raft during the past 25 years, the evolution of the automatic and instantaneous inflating device, and accessories are described by the author. One chapter gives an account of several thrilling rescues at sea. Synthetic rubber life rafts now under test are believed to be superior in many ways to those constructed of natural rubber.

Because of the lack of weight and bulk, rubber rafts will find many uses where rigid boats and canoes are impracticable. Mr. Wandless suggests such uses by explorers, forest rangers, and for much auxiliary water travel in remote spots.

"Chemistry and the Aeroplane." Vernon J. Clancey. Published by The Ronald Press Co., 15 E. 26th St., New York, N. Y. 1943. Cloth, 5 by 7½ inches, 176 pages. Index. Price $2.25.

This readable volume considers the chemistry of liquid fuels, combustion plastics, and the behavior of gases in relation to flight, and conversely the effects of flight on the recent development of chemistry. The book is intended to provide a link between the theory of chemistry textbooks and the practice of flight. Enough theoretical chemistry, organic and physical, and metallurgy is included to bridge successfully the gap.

The part chemistry has played in making flight possible and in shaping the form of the modern airplane is shown by emphasizing the historical aspects of the subject from the early development of mathematics and mechanics in ancient Egypt. The contributions of Archimedes, Galileo, Copernicus, da Vinci, and Newton and others are detailed.

A few of the chemical problems beyond those of the main materials of construction and fuel are discussed. The preparation of latex and the vulcanization and compounding of rubber is given cursory treatment. Synthetic rubber is disposed of in one sentence.

The book was originally published in England in 1942, and reflects the thought and experience in aeronautics of that country.

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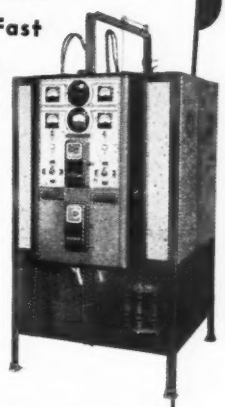

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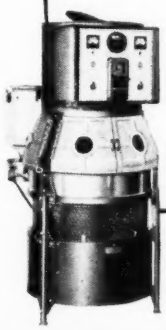

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COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	$0.04
Rottenstone, domestic	lb.	.025	.03

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy technical, light	lb.	.0625 /	.07

Accelerators, Organic

A-1	lb.	.28 /	.33
A-10	lb.	.36 /	.42
A-19	lb.	.52 /	.65
A-32	lb.	.60 /	.70
A-46	lb.	.50 /	.57
A-77	lb.	.42 /	.55
A-100	lb.	.42 /	.55
Accelerator 49	lb.	.41 /	.42
808	lb.	.59 /	.61
833	lb.	1.13 /	1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Aldehyde ammonia	lb.	.65 /	.70
Altax	lb.	.43 /	.45
Arazate	lb.	1.53	
B-J-F	lb.	.38 /	.43
Beutene	lb.	.59 /	.64
Butasan	lb.	1.13	
Butazate	lb.	1.13	
Butyl Eight	lb.	.97 /	.99
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Captax	lb.	.38 /	.40
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Ethasan	lb.	1.13	
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Formaldehyde P.A.C.	lb.	.06 /	.0625
Formaldehyde-para-toluidine	lb.	.63 /	.65
Formaniline	lb.	.36 /	.37
Guantal	lb.	.39 /	.48
Hepteen	lb.	.34 /	.39
Base	lb.	1.25 /	1.40
Hexamethylenetetramine U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.135	
Witco	lb.	.15	
Ledate	lb.	1.48	
M-B-T	lb.	.38 /	.40
M-B-T-S	lb.	.43 /	.45
Methasan	lb.	1.23	
Methazate	lb.	1.23	
Monex	lb.	1.53	
Morfex "33"	lb.	.67 /	.72
"55"	lb.	.96 /	1.01
O-X-A-F	lb.	.38 /	.43
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.74 /	.84
Flour	lb.	.1225 /	.1325
O	lb.		
Flour	lb.		
Phenex	lb.	.49 /	.54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
R & H 50-D	lb.	.42 /	.43
Rotax	lb.	.48 /	.50
Safex	lb.	1.15 /	1.25
Santocure	lb.	.60 /	.67
Selenac	lb.	1.98	
SPDX	lb.	.69 /	.74
A	lb.	.69 /	.74
SRA No. 1	lb.	.38 /	.50
Super Sulphur No. 2	lb.	.13 /	.15
Tetrone A	lb.	2.20	
Thiocarbanilide	lb.	.28 /	.33
Thiofide	lb.	.43 /	.50
Thionex	lb.	1.53	
Thiotax	lb.	.38 /	.45
Thiurad	lb.	1.53	
Thiuram E	lb.	1.53	
M	lb.	1.53	
Trimene	lb.	.54 /	.64
Base	lb.	1.03 /	1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.53	
Tuex	ton	1.53	
2-MT	lb.	.58 /	.60
Ulto	lb.	$0.99	/$1.04
Ureka	lb.	.50 /	.57
Blend B	lb.	.50 /	.57
C	lb.	.48 /	.55
Vulcanex	lb.	.42 /	.43
Z-B-X	lb.	2.45	
Zenite	lb.	.40 /	.42
A	lb.	.45 /	.47
B	lb.	.42 /	.44
Zimate, Butyl	lb.	1.13	
Ethyl	lb.	1.13	
Methyl	lb.	1.23	
Zipacel	lb.	1.65	

Activators

Aero Ac 50	lb.	.46 /	.52
Barak	lb.	.50	
MODX	lb.	.295 /	.345
SL-20	lb.	.1089 /	.1135

Age Resisters

AgeRite Alba	lb.	1.95 /	2.05
Gel	lb.	.52 /	.54
Hipar	lb.	.61 /	.63
Powder	lb.	.43 /	.45
Resin	lb.	.43 /	.45
D	lb.	.43 /	.45
White	lb.	1.23 /	1.33
Akroflex C	lb.	.53 /	.65
Albasan	lb.	.69 /	.74
Aminox	lb.	.43 /	.52
Antox	lb.	.54 /	.56
Betanox	lb.	.43 /	.52
B-L-E	lb.	.43 /	.52
Powder	lb.	.61 /	.70
B-X-A	lb.	.43 /	.52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.45 /	.55
White	lb.	.89 /	1.00
M-U-F	lb.	1.48	
Neozone (standard)	lb.	.61 /	.63
A	lb.	.43 /	.45
C	lb.	.43 /	.55
D	lb.	.43 /	.45
Distilled	lb.	.48 /	.50
E	lb.	.61 /	.63
Oxynone	lb.	.77 /	.90
Permalux	lb.	1.18 /	1.20
Santoflex B	lb.	.45 /	.55
BX	lb.	.56 /	.64
Santovar O	lb.	1.35 /	1.40
Stabilite	lb.	.48 /	.69
Alba	lb.	.50 /	.74
Thermoflex A	lb.	.61 /	.63
C	lb.	.54 /	.56
Tysonite	lb.	.165 /	.17
V-G-B	lb.	.43 /	.52

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 lbs.	2.70 /	3.55
Liquid, 50%	100 lbs.	1.95	
Solid (100-*lb. drums*)	100 lbs.	2.30 /	3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.34 /	.39
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445 /	.475
U-T-B	lb.	.34 /	.39

Antiseptics

Compound G-4	lb.	1.25	
G-11	lb.	5.65	

Antisun Materials

Heliozone	lb.	.23 /	.24
S.C.R.	lb.	.32 /	.34
Sunproof	lb.	.2275 /	.2775
Jr.	lb.	.165 /	.215

Blowing Agents

Ammonium carbonate, lumps (500-*lb. drums*)	lb.	.0825	
Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175 /	.0185

Colors

Black

Du Pont powder	lb.	.42	
Lampblack (commercial), *l.c.l.*	lb.	.15	

Blue

Du Pont Dispersed	lb.	.35 /	.95
Powders	lb.	2.25 /	3.75
Heliogen BKA	lb.		
Toners	lb.		

Brown

Mapico	lb.	.1135	

Green

Chrome	lb.	$0.25	
Oxide (*freight allowed*)	lb.	.24	
Du Pont Dispersed	lb.	.98	/$2.85
Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		

Orange

Du Pont Dispersed	lb.	.88 /	2.35
Powders	lb.	2.75 /	3.05
Toners	lb.		

Orchid

Toners	lb.	**	

Pink

Toners	lb.	**	

Purple

Toners	lb.	**	

Red

Antimony			
Crimson, 15/17%	lb.		
R.M.P. No. 3	lb.	.48	
Sulphur free	lb.	.52	
Golden 15/17%	lb.		
7-A	lb.	.37	
Z-2	lb.	.25	
Cadmium, light (400-*lb. bbls.*)	lb.	.85 /	
Du Pont Dispersed	lb.	.93 /	2.05
Powders	lb.	.60 /	1.65
Iron Oxide, *l.c.l.*	lb.	.07 /	.15
Mapico	lb.	.0885 /	.096
Rub-Er-Red (*bbls.*)	lb.	.0975	
Toners	lb.		

White

Lithopone (*bags*)	lb.	.0425 /	.045
Albalith	lb.	.0425 /	.045
Astrolith (50-*lb. bags*)	lb.	.0425 /	
Azolith	lb.	.0425 /	.045
Titanium Pigments			
Ray-Bar	lb.	.0575 /	.0625
Ray-Cal	lb.	.055 /	.06
Rayox	lb.	.145 /	.155
Titanolith (50-*lb. bags*)	lb.	.056 /	.0575
Titanox-A LO and MO	lb.	.145 /	.15
C	lb.	.055 /	.0573
Ti-Tone	lb.		
Zopaque (50-*lb. bags*)	lb.	.145 /	.1525
Zinc Oxide			
Azo ZZZ-11	lb.	.0725 /	.075
44	lb.	.0725 /	.075
55	lb.	.0725 /	.075
66	lb.	.095 /	.0975
French Process, Florence			
Green Seal-8	lb.	.09 /	.0925
Red Seal-9	lb.	.085 /	.0875
White Seal-7	lb.	.095 /	.0975
Kadox, Black Label-15	lb.	.0725 /	.075
No. 25	lb.	.085 /	.0875
72	lb.	.0725 /	.075
Red Label-17	lb.	.0725 /	.075
Horse Head Special 3	lb.	.0725 /	.075
XX Red-4	lb.	.0725 /	.075
23	lb.	.0725 /	.075
72	lb.	.0725 /	.075
78	lb.	.0725 /	.075
80	lb.	.0725 /	.075
103	lb.	.0725 /	.075
110	lb.	.0725 /	.075
St. Joe (lead free)			
Black Label	lb.	.0725 /	.075
Green Label	lb.	.0725 /	.075
Red Label	lb.	.0725 /	.075
U.S.P.	lb.	.105 /	.1075
Zinc Sulphide Pigments			
Cryptone-BA-19	lb.	.056 /	.0585
BT	lb.	.056 /	.0585
CB	lb.	.056 /	.0585
MS	lb.	.0575 /	.06
ZS No. 20	lb.	.0825 /	.085
86	lb.	.0825 /	.085
230	lb.	.0825 /	.085
800	lb.	.0825 /	.085
Sunolith	lb.	.0425 /	

Yellow

Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	.60	
Du Pont Dispersed	lb.	1.25 /	1.85
Powders	lb.	.70 /	1.75
Mapico	lb.	.0685 /	.071
Toners	lb.		

Dispersing Agents

Bardex	lb.	.0425 /	.045
Bardol	lb.	.025 /	.0275
B	lb.	.05 /	.0525
Nevoll (*drums, c.l.*)	lb.	.02 /	.025

Extenders

Advagum 1098	lb.	.42	
1198	lb.	.40	
Extendex C	lb.		
Naftolen R-100	lb.	.10 /	.12
Oroplast	lb.	.11 /	.155
"600"	lb.	.14 /	.16
Vansak	gal.	.05 /	.06

Fillers, Inert

Asbestine, *c.l.*	ton	20.00	
Asbestos Fiber	ton	15.50 /	48.00
Barytes	ton	40.00	
f.o.b., St. Louis (50-*lb. paper bags*)	ton	25.55	
Off color, domestic	ton	29.00	
White, domestic	ton	38.50 /	40.00
Blanc fixe, dry, precip	ton	80.00	
Calcene	ton	37.50 /	43.00

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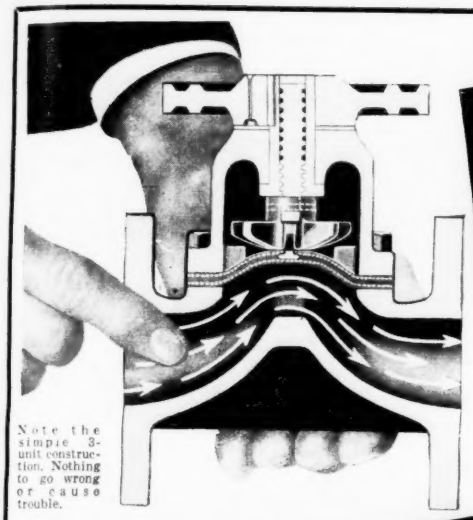

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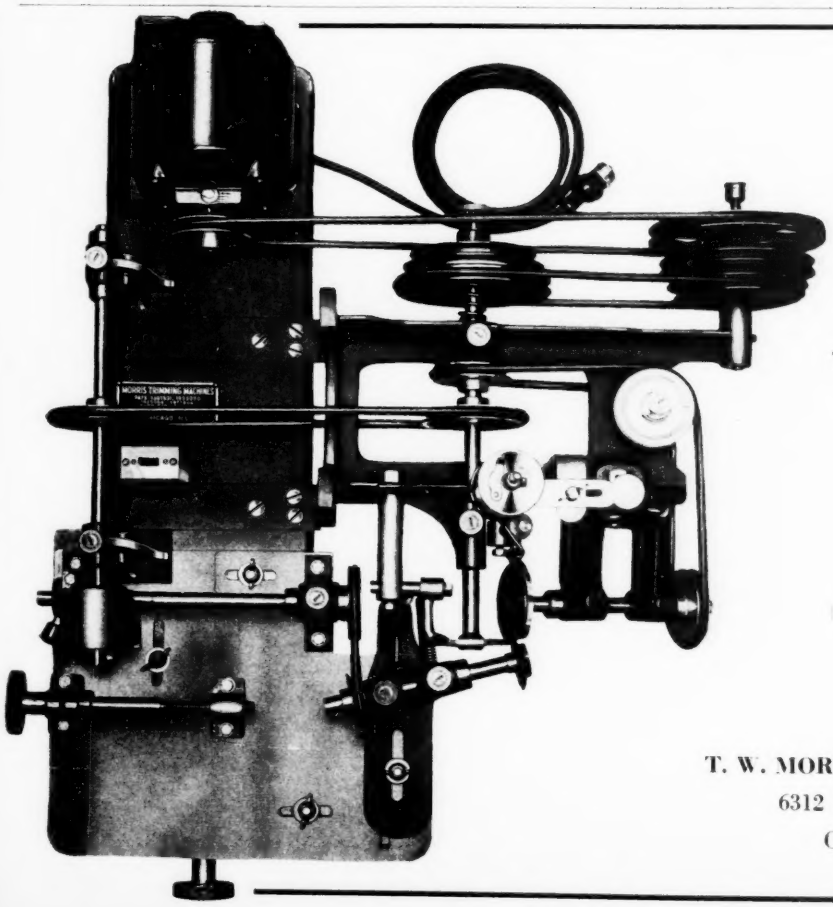

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Magnesium Carbonate *l.c.l.*	lb.	.0725	/$0.1075
Paradene No. 2 (*drums*)	lb.	.0525	
Pyrax A	ton	7.50	
Whiting			
Suprex White	ton	32.50	
Witco, *c.l.*	ton	8.00	
Witcal	ton	100.00	
Witcarb R-12	ton	40.00	

Finishes

Mica, *l.c.l.*	ton	20.00	/85.00
Rubber lacquer, clear	gal.	1.00	/ 2.00
Colored	gal.	2.00	/ 3.50
Shoe varnish	gal.	1.45	
Talc	ton	25.00	/35.00

Flock

Cotton flock, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Rayon flock, colored	lb.	1.00	/ 1.50
White	lb.	.75	/ 1.25

Latex Compounding Ingredients

Accelerator 552	lb.	1.63	
Aerosol OT Aqueous 25% (*drums*)	lb.	.35	
Antox, dispersed	lb.	.54	
Aquarex D	lb.	.75	
F	lb.	.85	
MDL Paste	lb.	.25	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400 dry	lb.	.51	/ .65
Black No. 25, dispersed	lb	.22	/ .40
Casein	lb.	.24	/24.75
Color Pastes, dispersed	lb.	.75	/ 1.10
Copper Inhibitor X-872	lb.	2.25	
Darvan No. 1	lb.	.30	/ .34
2	lb.	.30	/ .34
3	lb.	.30	/ .34
Dispersex No. 15	lb.	.11	/ .12
No. 20	lb.	.08	/ .10
Factex Dispersion A	lb.	.185	
Heliozone, dispersed	lb.	.25	
MICRONEX, Colloidal	lb.	.06	/ .07
Neoprene Latex Extender Emulsion 17	lb.	.12	/ .14
R-2 Crystals	lb.	1.55	
S-1 (400-*lb. drums*)	lb.	.65	
Santobrite Briquettes	lb.		
Powder	lb.		
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90	/ 1.10
B	lb.	.70	/ .95
C	lb.	.40	/ .50
Sulphur, dispersed	lb.	.10	/ .15
No. 2	lb.	.08	/ .12
T-1 (440-*lb. drums*)	lb	.40	
Tepidone	lb.	.63	
Tetrone A	lb.	2.20	
Tysonite, dispersed	lb.	.32	/ .35
Zenite Special	lb.	.47	
Zinc oxide, dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond, *l.c.l.*	ton	25.00	/ 30.00
B.R.C. No. 20	lb.	.0105	/01.15
Hydrocarbon, Hard	ton	25.00	/27.00
MilliMar	lb.	.055	
Parmr	ton	25.00	/30.00
Pioneer, *c.l.*	lb.	25.00	/30.00
285°-300°	ton	25.00	/27.00

Mold Lubricants

Aluminum Stearate	lb.	.23	/ .24
Aquarex D	lb.	.75	
MDL Paste	lb.	.25	
Colite	gal.	.90	/ 1.15
Dipez Mold Wash	lb.		
Lubrex	lb.	.25	/ .30
Rubber-Glo, conc. regular	gal.	.94	/ 1.15
Type W	gal.	.99	/ 1.20
Sericite	ton	65.00	
Soapstone, *l.c.l.*	ton	25.00	/ 35.00
Zinc Stearate	lb.	.30	/ .31

Oil Resistant

A-X-F	lb	.82	/ .85

Reclaiming Oils

B.R.V.	lb.	.035	/ .0375
C-10	gal.	.19	/ .24
D-4	gal.	.17	/ .22
E-5	gal.	.15	/ .20
No. 1621	lb.	.021	/ .0235
S.R.O.	lb.	.02	/ .0225
X-60 (reclaiming)	gal.	.20	/ .27
X-443	gal.	.29	

Reenforcers

Alumina, Hydrated			
Alorco C-740	lb.	.0375	/ .065
C-741	lb.	.0375	/ .065
Buca	ton	40.00	
Carbon Black			
Aerfloted Arrow Specification (*bags only*)	lb.	.0355†	
Arrow Compact Granulized	lb.	.0355†	
Certified Heavy Compressed (*bags only*)	lb.	$0.0355†	
SPHERON	lb.	.0355†	/$0.07
Channel "S"	lb.	.12	
Continental, dustless	lb.	.0355†	
"AA"	lb.		
Compressed (*bags only*)	lb.	.0355†	
Disperson	lb.	.0355†	
Dixie	lb.	.0355†	
20	lb.	.0355†	
Dixiedensed	lb.	.0355†	
66	lb.	.0355†	
77	lb.	.0355†	
Furnex Dense	lb.	.035	/ .06
Beads	lb.	.035	/ .06
Gastex	lb.	.035	/ .06
HX	lb.	.0355†	
Kosmobile	lb.	.0355†	
66	lb.	.0355†	
77	lb.	.0355†	
S	lb.	.0355†	
Kosmos	lb.	.0355†	
20	lb.	.0355†	
MICRONEX Beads	lb.	.0355†	/ .75
Hi-Tear	lb.	.0355†	/ .75
Mark II	lb.	.0355†	/ .75
Standard	lb.	.0355†	/ .75
W-6	lb.	.0355†	/ .75
P-33	lb.	.0475	
Pelletex	lb.	.035	/ .06
SPHERON C (*bags*)	lb.	.0455†	
1 (*bags*)	lb.	.0405	
N (*bags*)	lb	.15	
T (*bags*)	lb	.09	
Statex A	lb.	.08	/ .10
B	lb.	.07	/ .09
STERLING	lb.	.035	
Thermax	lb.	.0225	
"S"	lb.	.0675	
TX	lb.	.0355†	
Velvetex	lb		
"WYEX BLACK"	lb.	.0355†	
Carbonex Flakes	lb.	.03	/ .035
S	lb.	.031	/ .036
Plastic	lb.	.031	/ .0335
Clays			
Aerfloted Hi-White	ton	10.00	
LGB	ton	15.00	
Paragon (50-*lb. bags*)	ton	10.00	
Suprex (50-*lb. bags*)	ton	10.00	/23.50
Catalpo, *c.l.*	ton	30.00	
China	ton	25.00	
Dixie	ton	10.00	/22.50
"L"	ton	10.00	
Langford	ton	8.50	
McNamee	ton	10.00	
Par	ton	10.00	
Paraforce, *c.l.*	ton	50.00	
#33	ton	30.00	
Witco, *c.l.*	ton	10.00	
Cumar EX	lb.	.05	
MH	lb.	.065	/ .115
V	lb.	.095	/ .125
465 Resin	lb.		
"G" Resin	lb.		
Nevindene	lb.		
Silene "EF"	lb.	.055	/ .06

Reodorants

Amora A	lb.		
B	lb.		
C	lb.		
D	lb.		
Para-Dors (ABCD)	lb.	1.00	/ 3.40
Rodo No. 0	lb.	4.00	/ 4.50
10	lb.	5.00	/ 5.50

Rubber Substitutes

Black	lb.	.095	/ .17
Brown	lb.	.095	/ .18
White	lb.	.10	/ .20
Factice			
Amberex Type B	lb.	.20	
Brown	lb.	.095	/ .19
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.10	/ .20
Polyester, Millable 56-40A	lb.	.36	/ .38
Vulprene 72-28AR	lb.	.38	/ .45
Dispersion B7-41	lb.	.25	/ .26
Emulsion D4-31A	lb.	.29	/ .30

Softeners and Plasticizers

Ambidex Regular	lb.	.225	/ .23
"S"	lb.	.225	/ .23
B.R.T. No. 7	lb.	.02	/ .021
Bondogen	lb	98	/ 1.05
Buna Modifier 56-40	lb.	.30	/ .31
Bunnatol (for synthetic rubber)	lb.		
G	lb.	.40	/ .50
S	lb.	.40	/ .50
Burgundy pitch	lb.		
Copene Resin	lb.	.32	
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375	/ .04
Falkomer 106	lb.	.30	
108	lb.	.30	
LM-Nypene (*drums*)	lb.	.25	
LX-436 (*tank car*)	lb.	.027	
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	/ .14
Nuba resinous pitch (*drums*)			
Grades No. 1 and No. 2	lb.	.29	
3-X	lb.	.0425	
Nypene Resin	lb.	.32	
Palm oil (Witco), *c.l.*	lb.		
Palmalene	lb.	.15	/
Palmol	lb.	.16	/ 25
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	$0.046	/$0.048
Paradene No. 1 (*drums*)	lb.	.0525	
Special (*drums*)			
20 to 35° C. M.P.	lb.	.0625	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Piccocizer "30"	lb.		
Piccolyte Resins	lb.	.15	/ .185
Piccoumaron Resins	lb.	.045	/ .13
Pictar	gal.	.18	/ .23
Pine tar	gal.		
Oil	gal.	.45	
Plasticizer B	lb.	.35	/ .45
Plastoflex No. 10	lb.	.20	
No. 20	lb.	.25	
Plastogen	lb.	.0775	/ .08
Plastone	lb.	.27	/ .30
R-19 Resin (*drums*)	lb.	.1075	
21 Resin (*drums*)	lb.	.1075	
Reogen	lb.	.115	/ .12
RPA No. 1E	lb.	.55	
2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
Tarzac	lb.	.23	/ .24
Tonox	lb.	.50	/ .59
Turgum	lb.	.07	/ .0735
"S"	lb.	.0625	/ .0675
Vistac No. 1	lb.	.20	/ .214
No. 2	lb.	.214	/ .227
Witco No. 20, *l.c.l.*	gal.	.20	
X-1 resinous oil (*tank car*)	lb.	.011	/ .016
XX-100 Resin	lb.	.0525	

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015	/ .016
60°C. M.P.	lb.	.015	/ .016
75°C. M.P.	lb.	.015	/ .016

Solvents

Beta-Trichlorethane	lb.	.20	
Carbon Bisulphide	100 lbs.	5.75	
Tetrachloride	gal.	.80	
Cosol No. 1	gal.	.26	
No. 2	gal.	.25	
No. 3	gal.	.22	
Industrial 90% benzol (*tank car*)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.		

Stabilizers for Cure

Barium Stearate	lb.	.29	/ .32
Calcium Stearate	lb.	.26	/ .27
Laurex (*bags*)	lb.	.1475	/ .1725
Lead Stearate	lb.		
Magnesium Stearate	lb.	.31	/ .32
Stearex, Single Pressed	lb.	.15½	/ .16¾
Double Pressed	lb.	.15¾	/ .16¾
Beads	lb.	.14¾	/ .15¾
Stearic acid, single pressed	lb.		
Stearite, *c.l.*	lb.	.1487	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Hycar OR-15	lb.	.56	/ .72
OR-25	lb.	.50	/ .66
OS-10	lb.	.50	/ .66
Neoprene Latex Type 571 dry weight	lb.	.50	
60	lb.	.60	
Neoprene Type CG	lb.	.70	
E	lb.	.65	
FR	lb.	.75	
GN	lb.	.28	/ .30
ILS	lb.	.70	
KNR	lb.	.75	
M	lb.	.65	
Perbunan 26	lb.	.53	
Synthetic 100	lb.	.41	
"Thiokol" Type "A"	lb.	.35	
"FA"	lb.	.50	
Molding powder No. 472	lb.	.61	
1001	lb.	.75	

Tackifiers

B.R.H. No. 2	lb.	.02	/ .021
Buna Tackifier 56-36	lb.	.28	/ .30
LX-433 (*tank car*)	lb.	.068	
P.H.O. (*drums*)	lb.	.24	
Plastac	lb.	.12	
TY-PLY (Q, S, and SC)	gal.	6.75	/ 8.00

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25	
Sulphur	100 lbs.	2.05	
Chloride (*drums*)	lb.	.04	
Telloy	lb.	1.75	
Thiogen 6	lb.	.18	/ .25
10	lb.	.18	/ .25
Vandex	lb.	1.75	
(See also Colors—Antimony)			

Waxes

1515-A (black)	gal.	1.35	
C (clear)	gal.	1.25	
Carnauba, No. 3 chalky	lb.	.7125	
2 N.C.	lb.	.7575	
3 N.C.	lb.		
1 Yellow	lb.	.8325	
2	lb.	.8125	
Carnube	lb.	.49	/ .59
Monten	lb.	.12	/ .17
Rubber Wax No. 118,			
Neutral	gal.	.76	/ 1.31
Colors	gal.	.86	/ 1.41

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

VULCANIZED VEGETABLE OILS

—RUBBER SUBSTITUTES—

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

A LONG ESTABLISHED AND PROVEN PRODUCT

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

Regular and Special Constructions

of

COTTON FABRICS

Single Filling **Double Filling**

and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

	Oct. 30	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25
Futures						
Jan.	20.02	19.25	19.21	19.58	19.68	19.64
Mar.	19.90	19.30	19.26	19.68	19.71	19.68
July	19.52	18.87	18.86	19.25	19.24	19.17
Oct.	19.22	18.57	18.51	18.90	18.93	18.83

New York Quotations

December 31, 1943

Drills

38-inch 2.00-yard	yd.	....
40-inch 1.45 yard		....
50-inch 1.52-yard		$0.29
52-inch 1.85-yard		.23⅞
52-inch 1.90-yard	.23223	.2325
52-inch 2.20-yard		.20511
52-inch 2.50-yard		.185
59-inch 1.85-yard		.23851

Ducks

38-inch 2.00-yard D. F.	yd.	.215/.22⅜
40-inch 1.45-yard S. F.		.2975
51½-inch 1.35-yard D. F.		.335
72-inch 1.05-yard D. F.		.43/.45
72-inch 17-21 ounce		.48⅞

Mechanicals

Hose and belting	lb.	.4275

Tennis

51½-inch 1.35-yard	yd.	.315
51½-inch 1.60-yard	yd.	.27⅛
51½-inch 1.90-yard	yd.	.23⅛

Hollands — White

Blue Seal

20-inch	yd.	.135
30-inch		.2425
40-inch		.27

Gold Seal

20-inch	yd.	.145
30-inch		.2575
40-inch		.29

Red Seal

20-inch	yd.	.1225
30-inch		.22
40-inch		.245

Osnaburgs

40-inch 2.34-yard	yd.	.155⅜
40-inch 2.48-yard		.14⅝
40-inch 2.56-yard S. F.		.14578
40-inch 3.00-yard		.1275
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21⅜
37-inch 2.42-yard clean		.1525

Raincoat Fabrics

Cotton

Bombazine 64 x 60	yd.	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38½-inch, 64 x 60		.08971

Sheeting, 40-inch

48 x 48, 2.50-yard	yd.	.16200
64 x 68, 3.15-yard		.13968
56 x 60, 3.60-yard		.11944
44 x 40, 4.25-yard		.09764

Sheetings, 36-inch

48 x 44, 5.00-yard	yd.	.08600
40 x 40, 6.15-yard		.06991

Tire Fabric:

Builder

17¼ ounce 60" 23/11 ply Karded peeler	lb.	.48

Chafer

14 ounce 60" 20/8 ply Karded peeler	lb.	.48
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.45

Cord Fabrics

23/5/3 Karded peeler, 1⅛" cotton	lb.	.44
15/3/3 Karded peeler, 1⅛" cotton	lb.	.42
12/4/2 Karded peeler, 1⅛" cotton	lb.	.42
23/5/3 Karded peeler, 1¼" cotton	lb.	.44

Leno Breaker

8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.45

RESTRAINT marked the December cotton market as the war news retained its favorable tenor and as Congressional bickering over the subsidy issue resulted in a 60-day postponement. Sellers, as well as buyers, were on their guard in view of the inflationary implications drawn from the higher wage trend. House action authorizing the OPA to increase the crude oil price minimum, and the slow rate of spot sales of cotton to mills. The textile strike in Fall River, Mass., and the possible spread of strikes throughout the industry if wage requests are not answered bred further caution. Approach of the year-end, when mills are busy checking inventory and making other fiscal adjustments, points to a continuance of the present market mood.

There is a tendency, too, to await Congressional action on the Bankhead Bill which seeks to raise the cotton loan rate from 90% to 95% of parity. The House adopted a resolution extending the life of the Commodity Credit Corp. to February 5, following an earlier extension by the Senate of the CCC's life to February 29, but the Senate probably will agree to the date set by the House measure. Meanwhile intimations grow that the bulk of the 1943-crop cotton will eventually find its way to the government loan.

The Census Bureau reported that cotton consumed during November totaled 858,813 bales of lint and 109,987 bales of linters, compared with 912,920 bales of lint and 113,430 of linters in November, 1943. Consumption for the four months ended November 30 totaled 3,419,391 bales of lint and 446,192 bales of linters, against 3,770,653 and 467,025 bales, respectively, in the corresponding period a year ago.

The Department of Agriculture in its final 1943 report estimated the year's cotton crop at 11,478,000 bales, or about 1,340,000 bales less than in 1942 and 996,000 bales less than the 1932-41 average. The crop is expected, however, to exceed domestic consumption needs for the season by more than 500,000 bales. Supplementing this year's crop is a carry-over of more than 10,000,000 bales from previous years. The Department also revealed that for November the volume of trading on the New York Cotton Exchange was 3,243,000 bales, compared with 1,910,000 in October and 3,527,000 in November, 1942.

The price of 15/16-inch spot middling grade dropped from 20.09¢ on December 2 to 19.98¢ the next day, rose steadily to reach 20.42¢ on December 13, fell to 20.40¢ on the fourteenth, hit 20.48¢ December 15, declined to 20.38¢ on December 17, climbed up to 20.45¢ December 20, dropped to 20.27¢ on December 21, back to 20.34¢ on December 22, and closed at 20.52¢ on December 31.

Fabrics

A readier disposition to sell is expected in the near future. It is not overlooked that mills have sold themselves ahead by degrees and that their looms are not so lacking in forward business as may be supposed. Too large contracts are not wanted because mill efficiency is not up to par. Higher wage demands hang over the industry, and supplies cost more. As a result, the desire is to concentrate on the goods which offer the least risk in operations. Within limits, sheeting and sateen business has been booked, but the waiting orders are many times as large as those taken during the recent past.

Quite a bit of activity centered about print cloths, sheetings of coating quality, and drills for which the Quartermaster Depot at Philadelphia awarded contracts for a total of nearly 18,000,000 yards. There was some selling of print cloths to civilian users, but no remarkable increase; while coarse goods were available only in small amounts for other than military uses.

Fixed Government Prices*

Balata	Price per Pound, Civilian Use	Price per Pound, Other Than Civilian Use
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	31
Latex		
Normal (*tank car lots*)	26	.43½
Creamed (*tank car lots*)	26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	29½	47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅝	.38⅞
2X Brown Crepe	.21⅛	.38⅛
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¾	.37⅝
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24⅝
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19⅝
(washed and dried)	.18	.35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¼
Red passenger tubes	7¼
Passenger tubes	6

Tires‡	$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00

Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50

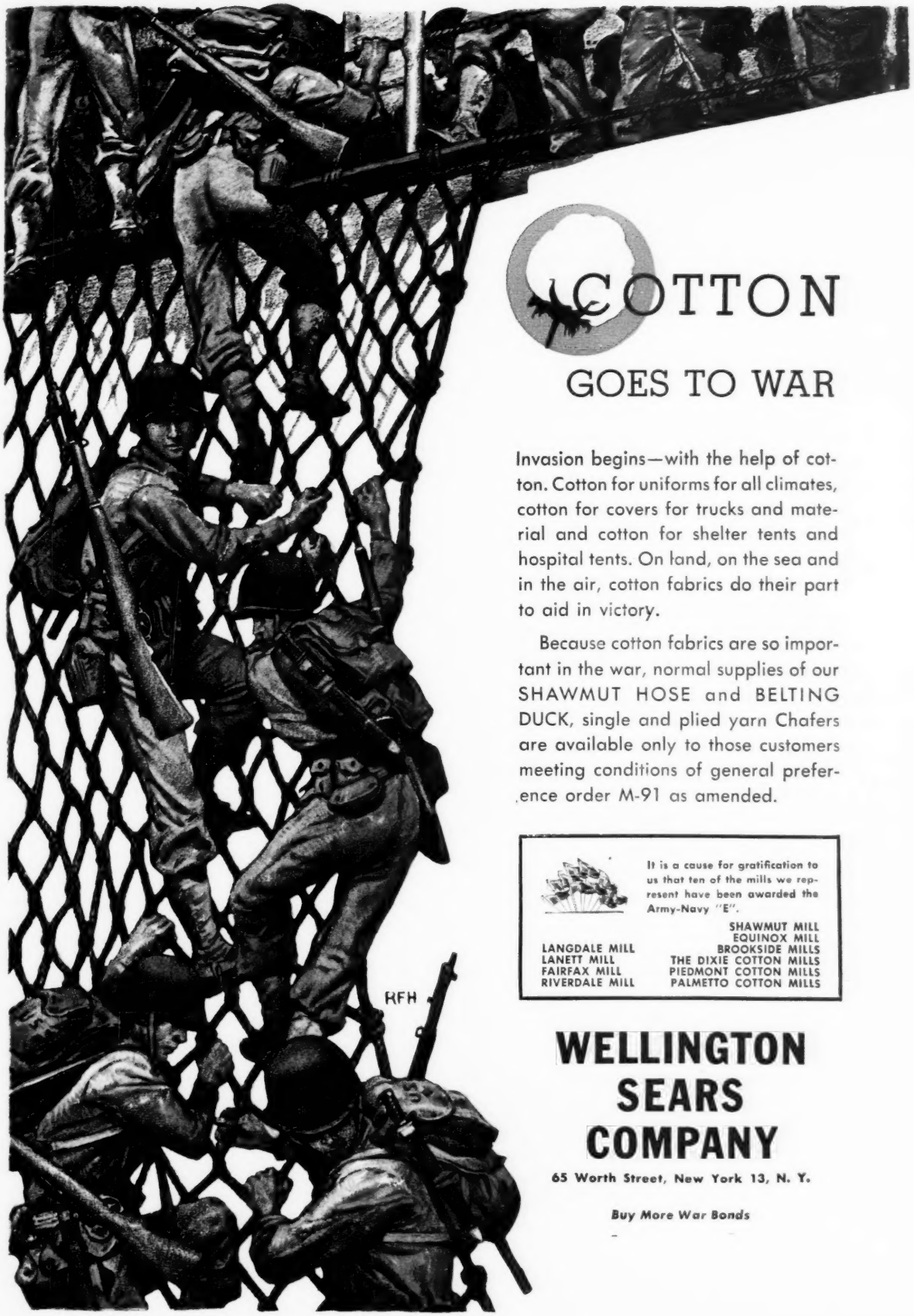
Miscellaneous Items‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
‡ All consuming centers.

Reclaimed Rubber Prices

Auto Tire	Sp. Grav.	¢ per Lb.
Black Select	1.16–1.18	6½/ 6¾
Acid	1.18–1.22	7½/ 7¾
Shoe		
Standard	1.56–1.60	7 / 7¼
Tubes		
Black	1.14–1.26	11¼/11½
Gray	1.15–1.26	12½/13¼
Red	1.15–1.32	12 /12¼
Miscellaneous		
Mechanical blends	1.25–1.50	4½/ 5½
White	1.35–1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.



COTTON GOES TO WAR

Invasion begins—with the help of cotton. Cotton for uniforms for all climates, cotton for covers for trucks and material and cotton for shelter tents and hospital tents. On land, on the sea and in the air, cotton fabrics do their part to aid in victory.

Because cotton fabrics are so important in the war, normal supplies of our SHAWMUT HOSE and BELTING DUCK, single and plied yarn Chafers are available only to those customers meeting conditions of general preference order M-91 as amended.

It is a cause for gratification to us that ten of the mills we represent have been awarded the Army-Navy "E".

SHAWMUT MILL
EQUINOX MILL
LANGDALE MILL
LANETT MILL
FAIRFAX MILL
RIVERDALE MILL
BROOKSIDE MILLS
THE DIXIE COTTON MILLS
PIEDMONT COTTON MILLS
PALMETTO COTTON MILLS

WELLINGTON SEARS COMPANY

65 Worth Street, New York 13, N. Y.

Buy More War Bonds

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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

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Allow nine words for keyed address.

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Light face type 40c per line (ten words)
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Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

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Replies forwarded without charge

SITUATIONS OPEN

WORKS MANAGER

For large rubberwear and sundries manufacturing plant. Must know modern methods of production, costs, etc. Age 40-55. Salary high commensurate with ability

All negotiations confidential. Employer pays fee.

WILLIAM H. SHUMWAY INC.
Personnel Counselors
176 Federal Street Boston, Mass.

CHEMIST AND FACTORY SUPERINTENDENT TO take charge of Small Rubber Factory in Chicago Area. Excellent opportunity. Address Box No. 723, care of INDIA RUBBER WORLD.

TIRE AND TUBE DEVELOPMENT, PROCESS OR construction engineers—Location outside Ohio. Address Box No. 724, care of INDIA RUBBER WORLD.

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WANTED: MAN BETWEEN 40 AND 55 YEARS OF AGE—KNOWS rubber manufacturing in general—but mainly must be a producer. Salary $10,000 per annum. Applicant must have full factory experience. No sales experience necessary. Address Box No. 729, care of INDIA RUBBER WORLD.

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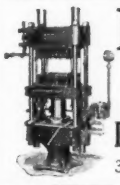

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INDEX TO ADVERTISERS

This index is maintained for the convenience of our readers. It is not a part of the advertisers' contract, and INDIA RUBBER WORLD *assumes no responsibility to advertisers for its correctness.*

Page

A

Adamson Machine Co., The 354
Advance Solvents & Chemical Corp. —
Akron Equipment Co., The 356
Akron Standard Mold Co., The —
Albert, L. & Son 425
Aluminum Co. of America —
Aluminum Ore Co. —
American Alkyd Industries, Inc. 399
American Cyanamid & Chemical Corp. 355
American Resinous Chemicals Corp. —
American Zinc Sales Co. —
Atlas Electric Devices Co. 417
"Automatic" Sprinkler Corp. of America 400

B

Baldwin Southwark Division, The Baldwin Locomotive Works —
Barco Mfg. Co., Not Inc. 334
Barr Rubber Products Co., The 358
Barrett Division, The, Allied Chemical & Dye Corp. 336
Barry, Lawrence N. 425
Beacon Co., The 404
Bunney & Smith Co., Insert, 377, 378
Black Rock Mfg. Co. 358
Bonwitt, Eric 425
Brockton Tool Co. 358
Brooklyn Color Works, Inc. 412
Butterworth, H. W., & Sons Co. 413

C

Cabot, Godfrey L., Inc., Front Cover
Cambridge Instrument Co., Inc. 409
Cameron Machine Co. 406
Canfield, H. O., Co., The 412
Carey, Philip, Mfg. Co., The 412
Carrier Corp. —
Carter Bell Mfg. Co., The 421
Claremont Waste Mfg. Co. 356
Cleveland Liner & Mfg. Co., The Back Cover
Colonial Insulator Co., The 358
Columbian Carbon Co., Insert, 377, 378
Continental Carbon Co. 351

Page

Continental-Mexican Rubber Co., Inc. 414
Curran & Barry 421

D

Daxol Rubber Co. —
Day, J. H., Co., The 408
Dispersions Process, Inc. 341
Dunning & Boschert Press Co., Inc. 425
du Pont, E. I., de Nemours & Co., Inc., Inside Front Cover

E

Eagle-Picher Lead Co., The 410
Erie Engine & Mfg. Co. 403

F

Farrel-Birmingham Co., Inc. 339
Fawick Airflex Co., Inc. 405
Flexo Supply Co., Inc. 358
French Oil Mill Machinery Co., The 416

G

Galey Manufacturing Co. 350
Gammeter, W. F., Co., The 416
General Atlas Carbon Division of General Properties Co., Inc. 358
General Tire & Rubber Co., The 354
Gidley, Philip Tucker 424
Givaudan-Delawanna, Inc. —
Glyco Products Co., Inc. 406

H

Hall, C. P., Co., The 401
Herron Bros. & Meyer 338
Heveatex Corp. —
Hills-McCanna Co. 419
Home Rubber Co. 354
Huber, J. M., Inc. 360
Hycar Chemical Co. 331

I

International Pulp Co. 358
Interstate Welding Service 346

J

Jacoby, Ernest, & Co. —
Johnson, S. C., & Sons, Inc. —

Page

M

Magnetic Gauge Co., The 415
Marine Magnesium Products Corp. 350
Mercer-Robinson Co., Inc. 404
Meyercord Co., The —
Monsanto Chemical Co., Rubber Service Dept. —
Moore & Munger 340
Morris, T. W., Trimming Machines 419
Muehlstein, H., & Co., Inc. 345

N

National Erie Corp. —
National Rubber Machinery Co. 393
National Sherardizing & Machine Co., The 358
National Standard Co. 328
Naugatuck Chemical Division of U. S. Rubber Co. 329
Neville Co., The 359
New England Butt Co. 412
New Jersey Zinc Co., The 350
North American Philips Co., Inc. —

P

Pennsylvania Industrial Chemical Corp. 342
Pequanoc Rubber Co. —
Philadelphia Rubber Works Co., The 337
Pittsburgh Plate Glass Co., Columbia Chemical Division 347

R

Raud Rubber Co. —
Rare Metal Products Co. 356
Resinous Products & Chemical Co. 411
Revertex Corporation of America —
Robertson, John, Co., Inc. —
Royle, John, & Sons 335

S

St. Joseph Lead Co. —
Schulman, A., Inc., Inside Back Cover
Scott, Henry L., Co. 414
Shaw, Francis, & Co., Ltd. 352
Shore Instrument & Mfg. Co., The 416
Shumway, William H., Inc. 424

Page

Skelly Oil Co. —
Snell, Foster D., Inc. 424
Southland Cork Co. 358
Spadone Machine Co. 410
Stamford Rubber Supply Co., The 354
Stanco Distributors, Inc. 395
Standard Chemical Co. 357
Stanley Chemical Co., The —
Stauffer Chemical Co. 352
Sun Oil Co. 397

T

Taylor Instrument Cos. 332
Thiokol Corp. 353
Thropp, William R., & Sons Co. —
Timken Roller Bearing Co., The 407
Titanium Pigment Corp. —
Turner Halsey Co. —

U

Union Bay State Co. 349
United Carbon Co., Inc., Insert, 343, 344
United Rubber Machinery Exchange 425
United Shoe Machinery Corp. —
Utility Manufacturing Co. 356

V

Vanderbilt, R. T., Co., Inc. 362

W

Wade, Levi C., Co. —
Wanted and For Sale 424, 425
Warwick Chemical Co. —
Warwick Wax Co., Inc. —
Wellington Sears Co. 423
Whittaker, Clark & Daniels, Inc. 414
Williams, C. K., & Co. 414
Wilmington Chemical Corp. 333
Wishnick-Tumpeer, Inc. 327
Wood, R. D., Co. —

Y

Yarnall-Waring Co. —

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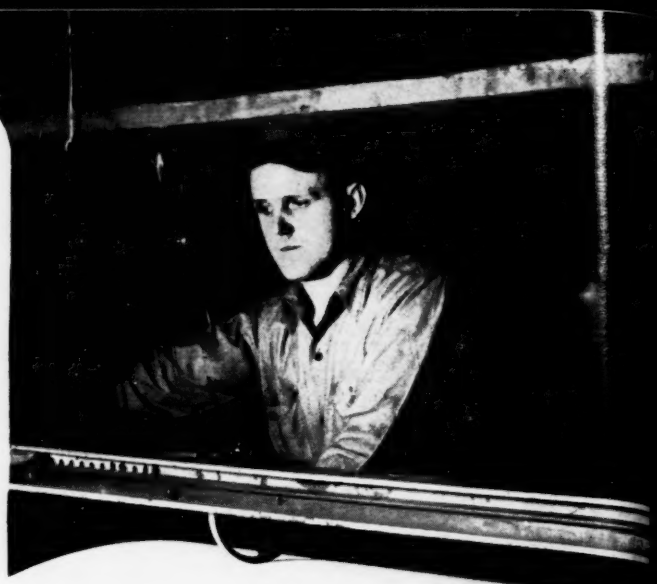

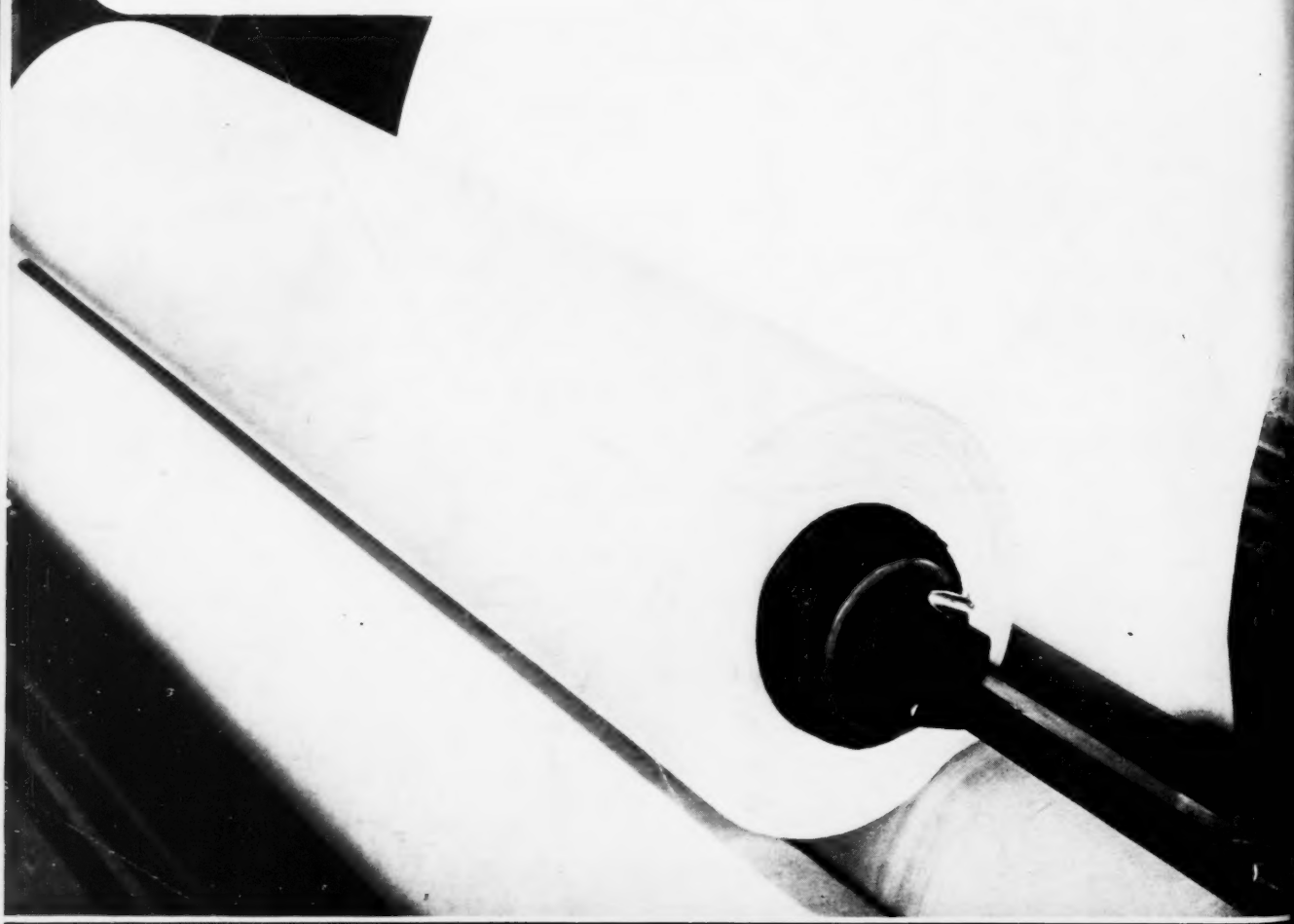

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